

Vol. III
TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1922.

No. 278.

LAYNE & BOWLER CORPORATION, PETITIONER,

vs.

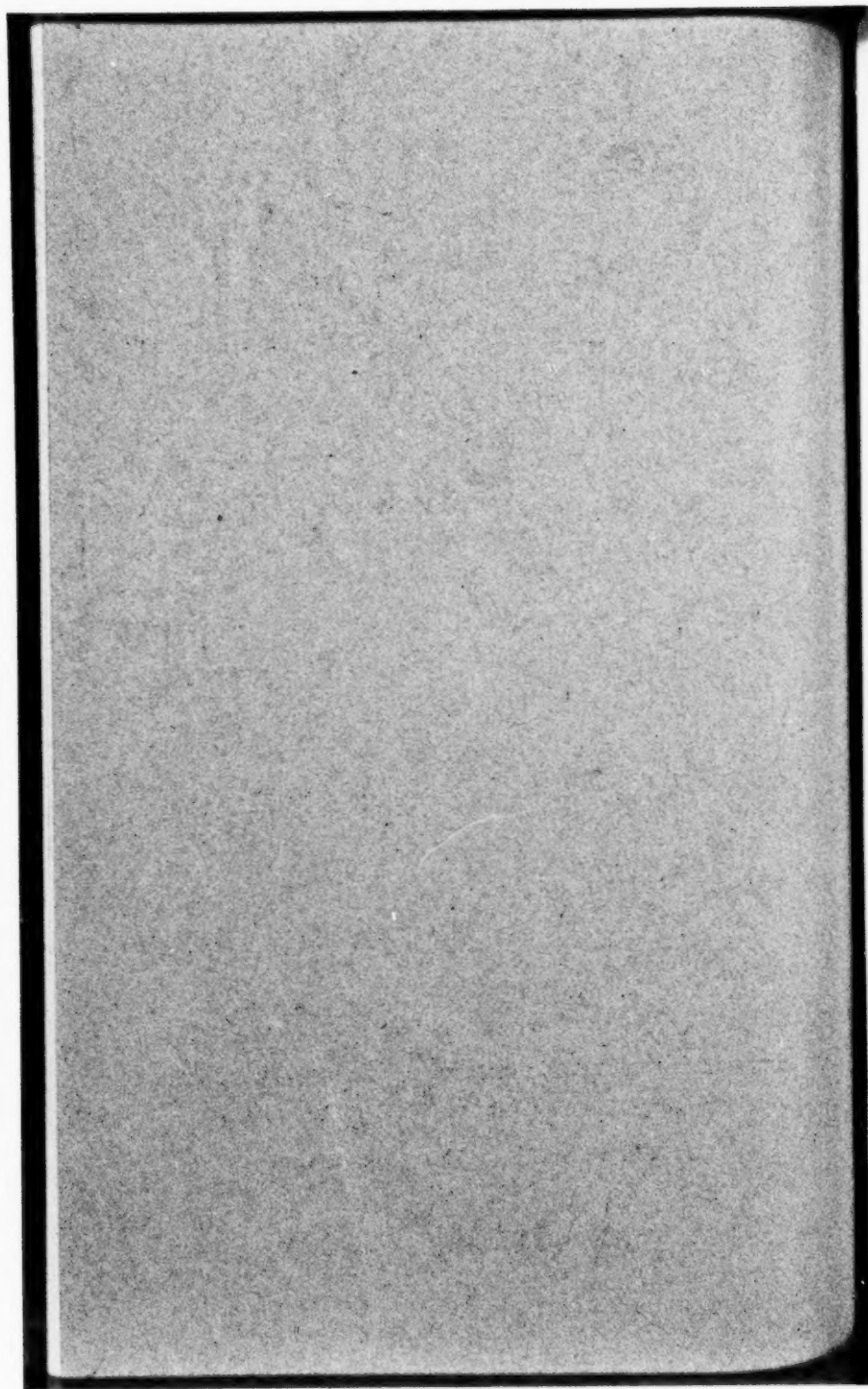
**WESTERN WELL WORKS, INC.; ROTARY DRILLING AND
DEVELOPMENT COMPANY, STANLEY M. HALSTEAD,
ET AL.**

**ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT
OF APPEALS FOR THE NINTH CIRCUIT.**

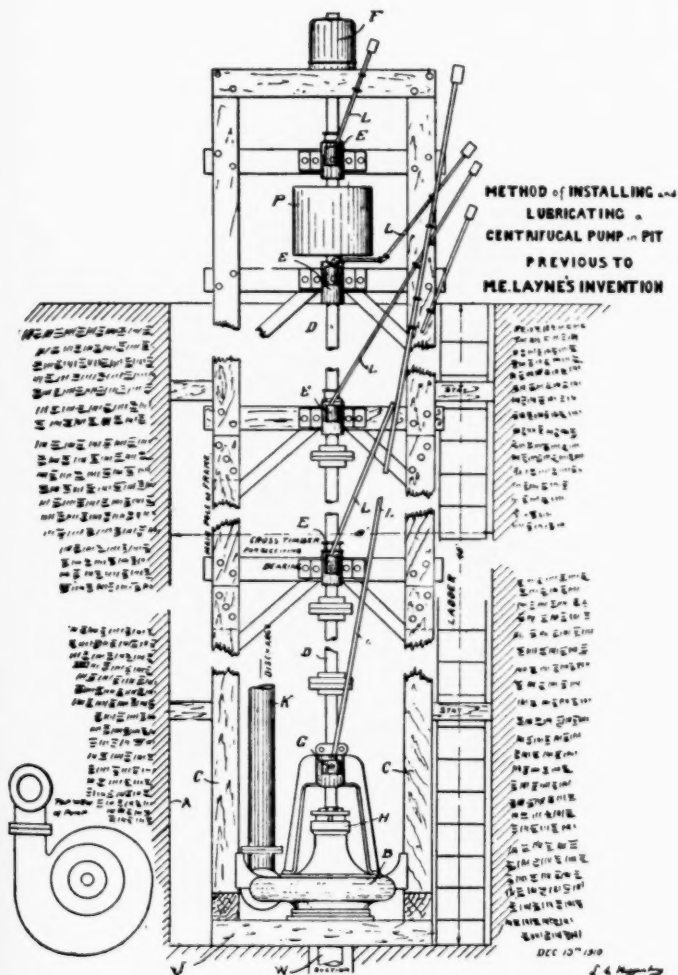
PETITION FOR CERTIORARI FILED FEBRUARY 24, 1923.

CERTIORARI AND RETURN APRIL 24, 1923.

(28,729)



Plaintiff's Exhibit No. 2.



[Endorsed]: 485-Eq. Plaintiff's Exhibit No. 2. Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monckton, Clerk.

Plaintiff's Exhibit No. 3.

CONTRACT.

THIS CONTRACT, made this first day of October, 1914, between THE LAYNE AND BOWLER CORPORATION, a corporation duly organized and existing under and by virtue of the laws of the STATE of California, and having its principal place of business at Los Angeles, California, hereinafter referred to as first party, and STANLEY M. HALSTEAD, of San Jose, California, and P. E. VAUGHAN, of Los Angeles, California, hereinafter referred to as second parties,

WITNESSETH:

WHEREAS the first party is extensively engaged in the manufacture, sale and use of certain patented pumps, screens, and other appliances used in the making and developing of wells throughout California, Arizona and New Mexico, and

WHEREAS the second party, S. M. Halstead, who has been heretofore employed by the first party in various capacities, and the second party, P. E. Vaughan, are desirous of starting up together in a separate and independent business, contemplating

the purchase of said patented pumps and screens from the first party, and the subsequent use thereof in the building, developing or equipping of wells, in the manner and subject to the conditions hereinafter specified,

NOW THEREFORE, the Parties Agree as follows:

PROVISIONS.

1.

The first party agrees to sell to the second party, its Screens, Pumps and Parts of Pumps for the purposes of repairs, replacement or extensions, and the second parties agree to accept delivery thereof f.o.b. cars Los Angeles proper (not Los Angeles Harbor). The second parties agree to pay therefor according to first party's list price at date of order, less the special discounts below mentioned. The first party, however, reserves the right to change its list prices at any time and in any particular, without notice, but after such time as the second parties have actual notice of the change in first party's list price, the second parties shall be entitled to make purchases hereunder to the amount of Five Thousand (\$5,000.00) Dollars at the old list price.

The first party shall not be obliged to accept, on any one day, orders from the second parties aggregating more than Five Thousand (\$5,000.00) Dollars.

For Pumps, the second parties agree to pay first party's list price at date when order is received by first party, less the special discount of twenty-five (25%) per cent from said list prices. Such list

prices shall, approximately, be the first party's retail selling price.

For Wire Wound Screen, the second parties agree to pay first party's list price at date when order is received by first party, less the special discounts of fifty (50%) per cent and twenty-five (25%) per cent from said list prices. Such list prices, less fifty (50%) per cent, shall, approximately, be first party's retail selling price.

For Shutter Screens, the second parties agree to pay first party's list price at date when order is received by first party, less the special discounts of twenty-five (25%) per cent and twenty-five (25%) per cent from said list prices. Such list prices, less twenty-five (25%) per cent, shall, approximately, be first party's retail selling price.

The above clauses reading in effect that "Such list prices shall, approximately, be first party's retail selling price," shall be construed as having been inserted into this contract for the purpose of insuring the second parties that first party will adhere to its present policy of selling its pump at list when it can, and its wire wound screens at list, less fifty (50%) per cent, when it can, and its shutter screens at list less twenty-five (25%) when it can, and when the first party cannot sell at these prices, then to sell as close to them as circumstances will admit. Said clauses are also inserted into this contract for the purpose of insuring the second parties that the first party will act in good faith and will not arbitrarily change its list prices for the sole purpose of closing the second parties off the market or of deliberately handicapping or abridging the second

parties' business contemplated hereunder. It is understood, however, that the first party's "list price," which is mentioned and referred to, and according to which the second parties will pay less the discounts mentioned, shall be its actual list price according to the ordinary commercial meaning of this term, and shall not be an average of its retail selling prices, or anything else like that. Also, the above quoted clauses shall not be construed as limiting the first party to sell its pumps at list, or its wire wound screens at list less fifty (50%) per cent, or its shutter screens at list less twenty-five (25%) per cent. The first party never has sold exactly at these prices, but has only endeavored to do so, and has sold as close to them as the circumstances of each particular case would admit, and it is not contemplated by either party that the execution of this contract shall require the first party to in any way change its policy concerning this relation between its list prices and its retail selling prices.

The first party shall make delivery promptly, but shall not be liable for any loss or damage whatever caused by accidents, fires, strikes, civil or military authority, or by insurrection or riot, or by any other cause beyond first party's control.

2.

If the second parties contract with one of their customers to furnish a pump, on condition that the customer may return it to them if the well in which it is to be installed does not furnish a specified amount of water, or that the customer may return it to them for any other reason previously stated by the second parties to the first party, and accepted

by the latter in writing, the second parties may state such condition or reason, and the particular amount of water specified, in their order for the pump from the first party, and if this has been done and the pump is returned to second parties on account of the well not furnishing the amount of water specified or on account of any of the other reasons previously agreed to in writing with the first party concerning that particular pump, then the second parties shall have the right to return such pump to the first party, provided it is delivered up at first party's factory in Los Angeles, free of all expense to first party, within ninety (90) days from the time when first party delivered it to second parties, unless the second parties have previously made special arrangements in writing with the first party, extending the time within which that pump may be returned. In event a pump is so returned, either within the ninety days, or within the time period covered by said special arrangements in writing, the second parties shall be allowed credit on such pump amounting to the invoice price thereof, less One (\$1.00) Dollar per foot for its total depth, but this minimum deduction of credit on any one pump shall be Fifty (\$50.00) Dollars. However, if first party's expenses in putting said pump in re-salable condition exceed the total deduction for credit computed as above, then the minimum deduction shall be first party's actual expenses incurred in this regard.

3.

On the fifteenth day of November, 1914, and on the fifteenth day of each and every month there-

after, the second parties shall deliver to first party a sixty (60) day, seven (7%) per cent note, signed by both of the second parties, and of bankable form satisfactory to the first party, covering all purchases and other indebtedness of whatever kind or form incurred by the second parties of the first part throughout the preceding calendar month, and all such notes shall be paid in cash at maturity. For this purpose, all delivery of pumps f.o.b. cars Los Angeles, as hereinbefore provided, shall be deemed a purchase on the part of the second parties, even tho the latter have a right to return the same under the provisions herein. However, the total credit which the first party will extend to the second parties, including all of the second parties' notes, open accounts, and all their other outstanding obligations whatever to first party, shall lie wholly within the discretion of first party, which shall have the right at any time to demand cash on delivery for further purchases made by second parties hereunder. However, if such demand for cash is made, and the same is paid upon delivery, the second parties shall be entitled to an additional discount of five (5%) per cent from the cash due.

For the guidance of the second parties in estimating the total amount of credit which may be anticipated under this contract, it is hereby certified that first party's Board of Directors has duly and formally passed the following resolution:

RESOLVED: That, under the contract this day authorized between this Corporation on the one side and Stanley M. Halstead and P. E. Vaughan on the other side, and contingent upon

a satisfactory statement signed by said Halstead and Vaughan, being delivered to first party, and showing that their net assets, over and above all their liabilities, reasonably amount to Twenty-five Thousand (\$25,000.00) Dollars, the Credit Department of this Corporation is hereby authorized to extend such credit as in its discretion may seem proper, but not to exceed Eleven Thousand (\$11,000.00) Dollars, unless authorization for credit in excess of this amount is first obtained from the Board of Directors. This total credit of Eleven Thousand (\$11,000.00) Dollars, shall include all notes, open accounts, and outstanding indebtedness of any sort whatever, due this Corporation under said contract, and also the indebtedness now due or owing to this Corporation from S. M. Halstead personally, but shall not include any indebtedness whatever which may arise between S. M. Halstead and this Corporation under the former's contract to purchase the well rig which has been heretofore delivered to him, nor shall it include the indebtedness which shall be incurred by the said S. M. Halstead and P. E. Vaughan on account of their taking over the automobiles or furnishings of this Corporation now used in conjunction with its San Francisco and San Jose offices. The taking over of said automobiles and furnishings, if at all, shall be under separate contract which shall provide the terms of payment.

4.

In event the second parties send in any orders

to be shipped them at points where there is no authorized Railroad agent to collect the freight, and the first party advances or prepays the freight thereon for the second parties, the second parties agree to remit in cash the amount of freight so advanced, within ten (10) days from the date when first party mails the second parties the freight bill covering the same. Money which has been thus advanced on freight shall not be left to go into the next sixty (60) day note mentioned in Provision 3, but shall be paid in accordance herewith. Also, it is understood that delivery shall be deemed to have been made by first party to second parties at Los Angeles as hereinbefore provided, and that at this point responsibility for the shipment shall cease in the first party.

5.

In consideration of the foregoing provisions, the second parties agree not to sell or use any other pumps, screens or perforated casings of whatsoever kind or form, in the building or equipping of wells, except the patented pumps and screens purchased of the first party in accordance herewith.

6.

It is mutually understood that the second party shall have the right to drill and equip wells complete anywhere throughout the States of California, Arizona, and New Mexico, provided the first party's pumps and screens are used exclusively throughout. The second parties shall also have the right to sell pumps for installation in wells drilled by other parties in California, north of the Thirty-fifth (35) Parallel, which line the parties agree to use as ex-

actly demarking the so-called **TEHACHAPI LINE** across California.

The second parties agree not to sell or furnish to others, screens delivered hereunder, for installation in wells to be drilled by other parties in Arizona or New Mexico, or in California south of the line just mentioned, and the second parties also agree not to sell or furnish pumps delivered hereunder, for installation in wells that other parties have drilled in Arizona or New Mexico, or in California south of said line. The second parties further guarantee that such screens or pumps shall not be used or installed in violation of this provision, in Arizona or New Mexico, or in California south of the line mentioned.

The second parties further guarantee that the patented pumps or screens furnished them hereunder, shall not be re sold or used outside of California, Arizona or New Mexico, unless the written license or authority for such re-sale or use has been first obtained from the party owning the patents thereon in the place where such re-sale or use is made.

7.

The second parties hereby acknowledge the validity of the following patents covering the above-mentioned Pumps and Screens, and which patents are owned by the first party in and throughout California, Arizona and New Mexico. The second parties also acquiesce in, and agree to acquiesce in said patents, throughout the life of each patent mentioned. This provision embraces and applies to the following patents:

Patent No. 750,206, dated Jan. 19th, 1904, to M. E.

Layne, for Wire Winding Tool.

Patent No. 805,211, dated Nov. 21st, 1905, to M. E. Layne, for Well Screen.

Patent No. 806,416, dated Dec. 5th, 1905, to M. E. Layne, for Screen Device.

Patent No. 820,507, dated May 15th, 1906, to M. E. Layne, for Wire Winding Machine.

Patent No. 821,653, dated May 29th, 1906, to M. E. Layne, for Well Mechanism.

Patent No. 1,001,655, dated Aug. 29th, 1911, to M. E. Layne, for Well Strainer.

Patent No. 1,079,679, dated Nov. 25th, 1913, to J. A. Wintroath, for Well Mechanism.

Patent No. (Re-issue) 13,467, dated Sept. 24th, 1912, to M. E. Layne, for Well Mechanism.

Concerning the above patents which cover the pump, the second parties agree that the term "enclosed line shaft," or the term "a closed casing surrounding the pump shaft from the pump to the top of the well," means and embraces any pump shaft for a deep well centrifugal pump, which is surrounded by a casing extending substantially from the pump to the top of the well and is provided with bearing parts for the shaft along its length, and which casing is sufficiently closed to allow the feeding of a lubricating fluid down thru said casing to the various bearing parts for the shaft therein.

8.

The second parties agree not to sell or use any of the patented screens furnished hereunder, for use in oil wells or in any other kind of wells except water wells, and the second parties guarantee that

such screens shall not eventually be used in oil wells in violation of this provision.

9.

The second parties enter upon this contract jointly and severally, and agree to be bound jointly and severally by each of its provisions. Furthermore, for the purposes of this contract, and for the giving of orders, the receiving of notices, and for the doing of anything which may arise in connection herewith, each of the second parties hereby appoints the other as his agent, so that both of them shall become jointly and severally bound by the acts or agreements of either in the course hereof, the same as tho they were partners.

10.

This contract shall not be assignable by the second parties, or either of them, unless the second parties first obtain the first party's written assent thereto, duly executed under the authority of the first party's Board of Directors.

11.

It is a specific condition, and part of the consideration, upon which the first party enters upon this contract, that the second parties shall abide strictly in each and every guarantee, condition, provision and part of a provision, contained throughout this contract, and any violation whatever of any such guarantee, condition, provision or part of a provision, shall entitle the first party to revoke and cancel this contract entirely, so that no business shall

thenceforth be done hereunder. In order to so cancel or revoke this contract, however, the first party shall give notice to that effect by registered letter mailed and addressed to either of the second parties at their last known address, within thirty (30) days from the time when first party first obtained knowledge of the breach or violation, and if such notice is not served within said thirty (30) days, the first party shall be deemed to have waived right to cancel or revoke this contract on account of that particular breach or violation. Upon the giving of such notice, the cancellation and revocation of this contract shall be immediate and complete, and no procedure whatever, either in law or equity, shall be required on the part of the first party, in order to cause such cancellation or revocation to take effect. If the contract is canceled or revoked, however, the same shall not effect or change in any manner, any liabilities previously created hereunder on either side.

12.

The life of this contract shall be for four years from the date hereof.

IN TESTIMONY WHEREOF the parties have caused these presents to be executed in duplicate, the day and year first above written, the first party signing its corporate name and affixing its seal thru its President and Secretary, thereunto duly author-

ized by its Board of Directors by resolution passed on the 7th day of October, 1914.

THE LAYNE AND BOWLER CORPORATION,

By P. D. BOWLER,
President.

[Corporate Seal] By W. E. BOWLER,
Secretary,
First Party.

S. M. HALSTEAD,
P. E. VAUGHAN,
Second Parties.

[Endorsed]: No. 485—Equity. Layne & Bowler Corp'n. vs. Western Well Works et al. Plaintiff's Exhibit No. 3. Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monekton, Clerk.

Defendants' Exhibit "A-1."

[Endorsed]: In the United States District Court, Northern District of California, Southern Division. In Equity—No. 485. Layne & Bowler Corporation, Plaintiff, vs. Western Well Works, Inc., a Corporation, et al., Defendants. Defendants' Exhibit "A-1." Hattie B. Lehman, Notary Public.

Filed Sep. 2, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monckton, Clerk.

No. 735,690.

PATENTED AUG. 11, 1903.

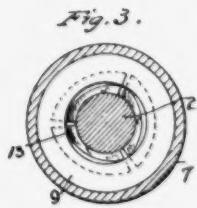
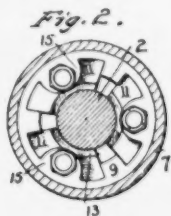
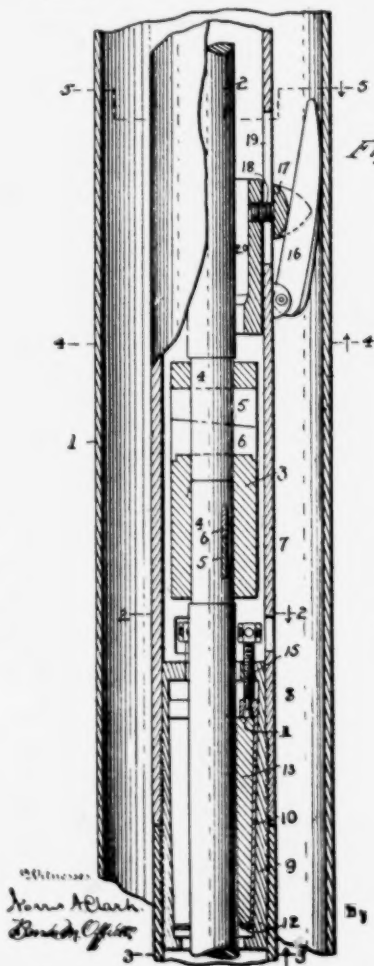
J. W. ALVORD.

MEANS FOR ALINING PUMP SHAFTS IN WELL CASINGS.

APPLICATION FILED NOV. 17, 1902.

NO MODEL

2 SHEETS—SHEET 1.



Witness:
 Harry A. Clark
 Bookkeeper

Witness:
 John W. Alvord
 J. W. Alvord
 Attorney

No. 735,690.

PATENTED AUG. 11, 1903.

J. W. ALVORD.

MEANS FOR ALINING PUMP SHAFTS IN WELL CASINGS.

APPLICATION FILED NOV. 17, 1902.

NO MODEL

2 SHEETS—SHEET 2.

Fig. 4.

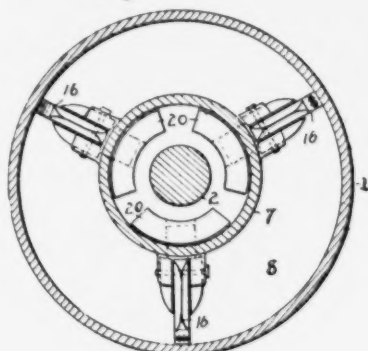
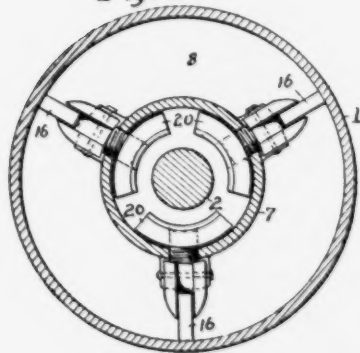


Fig. 5.



Inventor

John W. Alvord,
J. W. Alvord & Co.
Attorneys

Witnesses
Louis A. Clark.
Donald M. Offutt.

By

No. 735,690.

Patented August 11, 1903.

UNITED STATES PATENT OFFICE.

JOHN WATSON ALVORD, OF CHICAGO, ILLINOIS.

MEANS FOR ALINING PUMP-SHAFTS IN WELL-CASINGS.

SPECIFICATION forming part of Letters Patent No. 735,690, dated August 11, 1903.

Application filed November 17, 1902. Serial No. 131,663. (No model.)

To all whom it may concern:

Be it known that I, JOHN WATSON ALVORD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Means for Alining Pump-Shafts in Well-Casings; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to rotary pumps for deep wells; and its object is to provide means for automatically alining the pump-shaft.

The casing of a deep well, by which I mean a well having a depth of one hundred feet or more, is usually slightly crooked or sinuous, so that the shaft of a rotary pump located at or near the bottom of the well will not be equidistant from the casing throughout its entire length, but will be nearer to one side of the casing or the other at different points. It is of course necessary for the shaft to be absolutely straight in order to reduce the friction of the bearings to a minimum. My invention aims to keep the shaft perfectly straight, and yet support it rigidly in the casing by automatic alining devices.

In the accompanying drawings, Figure 1 is a longitudinal section of a portion of a well-casing, pump-shaft, and shaft-tube, with a shaft-bearing and a self-alining support for the tube. Figs. 2 and 3 are cross-sections at the lines 2 2 3 3, respectively, on a slightly larger scale. Fig. 4 is a cross-section at the line 4 4 on a still larger scale and showing the tube eccentric to the casing. Fig. 5 is a cross-section on the same scale at the line 5 5, showing the tube and casing concentric.

The well-casing 1 is a metal pipe of suitable diameter and circular in cross-section. It may or may not be perfectly straight throughout its entire length. The rotary pump (not shown) is located at the bottom of the well and is driven by a vertical shaft 2, rotated by any suitable means. (Not shown.) The shaft is made in suitable lengths united by rigid couplings, comprising, preferably, a sleeve 3, fitting the reduced ends 4 of the

shaft-sections, and fastened by the transverse keys 5 and cotters 6. The shaft is inclosed in a shaft-tube 7, made in suitable lengths coupled together and considerably less in diameter than the well-casing, so as to leave an annular space 8 between them for the water to flow up through. At suitable points in the tube are bearings for the shaft, consisting, preferably, of a bushing 9, rigidly secured in the tube, as by the screw-threads shown, and slightly tapered internally. Segmental carriers 10 are placed in the bushing, having flanges 11 12 at each end to confine the segmental bearing-blocks 13, which are preferably made of lignum-vitæ and fit the shaft closely. Adjusting-screws 14 are swiveled in the flanges 11 and mesh with tapped holes in lugs 15 on the adjacent end of the bushing, so by turning the screws the carriers and their blocks can be slid lengthwise in the tapering bushing, and thus be set in or out to fit the shaft. The heads of the screws are accessible through holes in the tube.

Hinged to the outside of the shaft-tube, at points adjacent to the upper end of the sleeve 3, are a plurality of braces 16, preferably sharpened along their under edges to reduce the resistance to the rising column of water. The braces extend upwardly, and as each brace is independently hinged it will naturally fall outward in a radial plane until its end rests against the inside of the well-casing. If the shaft-tube happens to be eccentric to the casing at that point, as shown in Fig. 4, the braces will stand at different angles. Means are provided for locking each brace independently in whatsoever position it assumes, so that the tube will be rigidly supported in the casing whether it is concentric or eccentric therewith. The locking device which I prefer consists of a wedge or chock 17, preferably forked and fitting against the outside of the shaft tube and having a shank 18 sliding in a longitudinal slot 19 in said tube behind the brace. Inside the tube is a segmental weight 20, fastened to the shank and causing the chock to drop until it wedges in the angular space between the tube and the back of the brace. In this position of the chock the brace is rigidly held against inward movement, and the coöperation of the several braces supports the tube firmly

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against any lateral displacement. To release the braces when the tube is to be raised or lowered in the casing, the shaft is so constructed and arranged as to be capable of an upward lengthwise movement sufficient to bring the upper end of the sleeve 3 against the lower ends of the segmental weights 20 and lift them and the chocks, thus unlocking the braces and leaving them free to move in and out as they slide up or down in the casing with the tube. When said tube has been relocated, the shaft is dropped, and the chocks again fall into place and lock the braces in whatsoever position they may happen to be.

It is thus evident that my invention provides means for automatically aligning a pump-shaft in a well-casing whether the latter is straight or crooked.

It will be understood that a plurality of aligning devices and locking and unlocking means will be provided, according to the length of the shaft.

Having thus described my invention, what I claim is—

1. The combination with a well-casing, of a straight rotary pump-shaft therein, and a plurality of independent, automatic adjusting devices located between the shaft and the casing, whereby said shaft is automatically braced in proper alignment irrespective of any deviation of said casing from a straight line.

2. The combination with a well-casing, of a straight rotary pump-shaft therein, bearings for said shaft, and a plurality of automatic, independently-adjustable devices serving to brace said bearings automatically in proper alignment in said casing, irrespective of any deviation of said casing from a straight line.

3. The combination with a well-casing, of a straight rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, and a plurality of automatic, independently-adjustable devices between said tube and casing, whereby the former is automatically braced in proper alignment irrespective of any deviations of the latter from a straight line.

4. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces between said tube and casing, and means for adjusting said braces independently of each other.

5. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces between said tube and casing, and means for adjusting and locking each brace independently.

6. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings for said shaft, braces between said tube and casing, means for locking each brace independently, and means for unlocking said braces simultaneously.

7. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces hinged to said tube, and means for locking said braces.

8. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces hinged to said tube, and a choke for wedging each brace.

9. The combination with a well-casing of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces hinged to said tube, a choke for wedging each brace, and means for lifting said chocks.

10. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces hinged to said tube, and a choke for each brace having a shank projecting into said tube and adapted to be lifted by an upward movement of the pump-shaft.

11. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces hinged to said tube, a choke for wedging each brace having a shank projecting into said tube, and a weight secured to said shank.

12. The combination with a well-casing, of a rotary pump-shaft therein having a sleeve thereon, a tube inclosing said shaft and having longitudinal slots therein, braces hinged to said tube, a choke for wedging each brace having a shank projecting through a slot, and a weight secured to said shank inside said tube and adapted to be lifted by said sleeve when said shaft is lifted.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN WATSON ALVORD.

Witnesses:

ROBERT O. HARPER.
FRED G. WILBER.

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Defendants' Exhibit "A-2."

[Endorsed]: In the United States District Court, Northern District of California, Southern Division. In Equity—No. 485. Layne & Bowler Corporation, Plaintiff, vs. Western Well Works, Inc., a Corporation, et al., Defendants. Defendants' Exhibit A-2. Hattie B. Lehman, Notary Public.

Filed Sep. 2, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monckton, Clerk.

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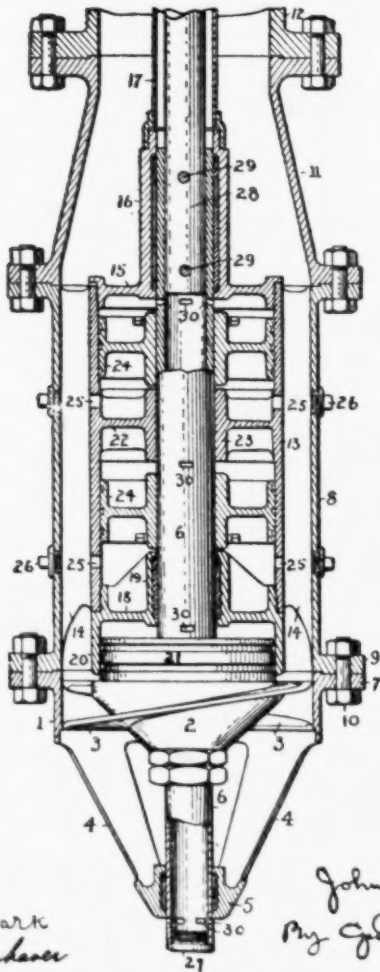
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No. 755,691.

PATENTED AUG. 11, 1903.

J. W. MOVORD.
HIGH SPEED ROTARY PUMP.
APPLICATION FILED DEC. 24, 1901.

NO. 1000.



Witnesses
Norris A. Clark
Geo. M. Copeland

John W. Alvord
By G. B. Whitman
Attorney

UNITED STATES PATENT OFFICE.

JOHN WATSON ALVORD, OF CHICAGO, ILLINOIS.

HIGH-SPEED ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 735,691, dated August 11, 1904.

Application filed December 24, 1902. Serial No. 136,465. (No model.)

To all whom it may concern:

Be it known that I, JOHN WATSON ALVORD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in High-Speed Rotary Pumps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the figures of reference marked thereon, which forms a part of this specification.

This invention relates to centrifugal pumps, and especially to those that are run at high speeds and lift water from deep wells, by which I mean wells a hundred feet or more in depth. In such wells the pump is located far below the surface of the ground and rotates in a horizontal plane, the shaft extending to the surface, where it is connected to a suitable motor. The weight of this upright shaft and the other rotating parts, together with the superimposed water column, is very great, and it is a serious problem to guide and support the shaft. In another application recently filed I have set forth means for maintaining such a shaft in proper alignment. The present invention has to do with the supporting of the superimposed water column, the shaft, and other rotating parts.

It has been proposed to balance the weight of such shafts and superimposed water column by the pressure of the water column in the uptake or delivery pipe.

My invention consists in certain novel constructions and arrangements of parts whereby this result can be effectively accomplished and automatically regulated. The shaft is journaled in bearings which permit it to have a certain amount of lengthwise play. Secured to the shaft is one or more pistons, which fits or fit in a cylindrical portion or portions of the stationary pump-casing and each forms one end of a chamber. The under side of the piston is exposed to the pressure of the water column in the uptake, while its upper side is subjected to the pressure in the chamber. There is an outlet from the chamber to the suction side of the pump, and this outlet is controlled by the lengthwise play of the shaft,

closing gradually as the shaft rises and opening when it falls. As there is a constant small leakage past the piston into the chamber, the pressure in said chamber tends to gradually increase, thus lessening the effective upward pressure on the under side of the piston. The shaft therefore moves slowly downward until it causes the outlet to open and relieve the pressure in the chamber, whereupon the fall of the shaft is checked. Thus by a series of constant adjustments and readjustments of the relative pressures on the two sides of the piston the differential pressure tending to lift the shaft is kept approximately constant, so that the shaft remains floating on the water column in substantially a constant position irrespective of the fluctuations in the actual pressure of the water column.

This invention is applicable to pumps having a great variety of impellers and can be carried out in many different ways. The accompanying drawing illustrates one mode of applying it to a rotary pump having a plain screw-impeller, the view being a longitudinal section of the pump.

The casing of the pump is made in sections, the lower section 1 being cylindrical to snugly inclose the impeller, which has a conical body 2 and helical blades 3, by means of which the water is given an upward motion when the impeller is rotated. The section 1 has depending arms 4, supporting the lower bearing 5 for the impeller-shaft 6. This section also has a flange 7, on which is mounted the preferably cylindrical body-section 8 by means of the flanges 9 and bolts 10. The upper section 11 is preferably conical and is fastened to the top of the body-section 8 and also to the lower end of the uptake or delivery pipe 12, preferably by the flanges and bolts shown. The body-section has a concentric inner shell 13, preferably united with the outer shell by radial webs 14, cast integral with both shells. The inner shell is provided at each end with a head, the upper one 15 carrying a bearing 16 for the impeller-shaft and also supporting the lower end of the shaft-casing 17. The lower head 18 has a bearing 19 for the impeller-shaft and also a cylindrical flange 20, inclosing a piston 21, on said shaft just above the body of the impeller and

735,691

ly less in diameter than said body. A way of the inner shell is a diaphragm 22, which is a bearing 23 for the shaft 6. This diaphragm divides the shell into two chambers, in each of which is a piston 24, secured to the shaft 6 and fitting the inside of the shell. Below each piston one or more holes are made in the shell, preferably by drilling through both shells, the holes in the outer shell being afterward closed by screw-plugs 25. It is evident that more than two chambers and pistons may be used, if desired.

The impeller-shaft 6 is tubular, its lower end being closed by a screw-plug 27, while its upper end is closed by the inwardly-projecting lower end of the pump-shaft 28, which fits in the shaft 6 and is secured thereto by transverse pins 29. The pump-shaft is preferably provided to give a maximum torsional strength. The ports 30 are cut at suitable points in the impeller-shaft just below the lower bearing 5 and the bearings 16, 19, and 23.

The operation of the pump is as follows: The impeller is rotated at high speed and forces the water up through the annular space between the outer and inner shells of the body-section 8 of the casing. The water passes freely through the holes 25, and the pressure due to the weight of the rising water column in the uptake-pipe is thus transmitted to the under side of the pistons 24. By properly proportioning the area and number of said pistons to the total weight of the rotating parts and the superimposed water column said weight can be balanced by the lift on the pistons. Hence no step-bearing is required for the shaft. There is a little leakage of water past the pistons into the chambers above them, and this water in time fills the chambers. In order to prevent it from acquiring a pressure equal to that on the under side of the pistons, and thus neutralizing the lifting effect of the water column, the ports 30 are so arranged with reference to the stationary shaft-bearings that when the pressure in the chambers reaches a predetermined limit the consequent drop of the shaft will bring said ports below said bearings, thus permitting the water in the chambers to enter the tubular shaft and escape through the lower ports into the well on the suction side of the impeller. By closing the lower end of the shaft and providing the lower set of ports 1 form an intermediate chamber between the casing and the well, and thus prevent too sudden changes of pressure in the chambers; but as soon as sufficient water has escaped to permit the resultant increased pressure on the under side of the piston to lift the pistons and shaft the ports will be closed and the equilibrium reestablished. The shaft, pistons, and impeller thus have a constant slight motion up and down as these adjustments of pressure occur. It will be noticed that they are independent of the actual pressure in pounds per square inch, since the balancing effect is due to the dif-

ferential pressure on the under side of the piston and not to the actual pressure of the water column. It will also be noticed that 70 by means of the piston 21 and its chamber and escape-ports the area of the impeller subjected to a downward pressure is no greater than that of its blades and that this is partially balanced by the upward pressure of 75 the water column on so much of the conical body of the impeller as lies above the blades.

I am aware that it has been proposed to provide the shaft of a rotary pump with a balancing piston and to utilize the water leaking past said piston to lubricate the adjacent shaft-bearing; but my invention aims to utilize the leakage to set up a differential pressure on the under side of the piston, so as to automatically balance the rotating parts 85 respectively of the height of the water column—a result not possible in the aforesaid proposed construction.

I claim—

1. In a rotary pump, the combination with 90 an upright axially-movable shaft, of a balancing-piston secured thereto and having its under side exposed to the pressure of the water column, a stationary casing containing a chamber above said piston, and means con- 95 trolled by the axial movement of the shaft for permitting the escape of water from said chamber to the suction side of the pump, and thus regulating the pressure in said chamber.

2. In a rotary pump, the combination with 100 an upright axially-movable shaft, of a stationary casing containing a chamber concentric with said shaft and having means to admit the pressure of the water column in the uptake, a piston secured to said shaft and 105 fitting the walls of said chamber, and escape-ports above said piston controlled by the axial movement of said shaft.

3. In a rotary pump, the combination with an upright axially-movable tubular shaft, of 110 a stationary casing containing a chamber concentric with said shaft and having holes in its walls, a piston secured to said shaft and fitting the walls of said chamber above said holes, and escape-ports in said shaft above 115 said pistons.

4. In a rotary pump, the combination with an upright axially-movable tubular shaft, of a stationary casing comprising two concentric shells, the inner one being closed at the 120 top and bottom and having holes in its walls, one or more pistons in said inner shell above said holes and secured to said shaft, and escape-ports in said shaft above said pistons, controlled by the axial movement of said 125 shaft.

5. In a rotary pump, the combination with an upright axially-movable tubular shaft, of a stationary casing, comprising two concentric shells, the inner one having a diaphragm 130 and provided with holes in its walls above and below said diaphragm, heads closing the top and bottom of said inner shell, shaft-bearings in said heads and diaphragm, pistons

735,691

secured to said shaft above said holes, and escape-ports in said shaft adjacent to the lower ends of said bearings.

6. In a rotary pump, the combination with
5 an axially-movable tubular shaft having its lower end closed and provided with ports, of a bearing adjacent to and above said ports, a balancing-piston secured to said shaft and having its under side exposed to the pressure
10 of the water column, a stationary casing containing a chamber for said piston, and means for putting said chamber in communication with the interior of said shaft when the resultant pressure on the under side of the pis-
15 ton falls below a predetermined limit.

7. In a rotary pump, the combination with a stationary casing comprising two concentric shells, of a shaft concentric with said shells, an impeller on the shaft having a con-
20 ical body carrying a piston fitting a chamber at the lower end of the inner shell, means for

permitting the escape of leakage-water from said chamber to the suction side of the pump, and a balancing-piston in the inner shell exposed underneath to the pressure of the water column and above to the pressure in a chamber in said shell.

8. In a rotary pump, the combination with a stationary pump-casing, of an impeller, in shaft, a balancing-piston secured on the shaft, a casing surrounding said piston and communicating below the piston with the uptake, and means for automatically regulating the pressure on the top of the piston, whereby the differential pressure on its under side will remain substantially constant.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN WATSON ALVORD.

Witnesses:

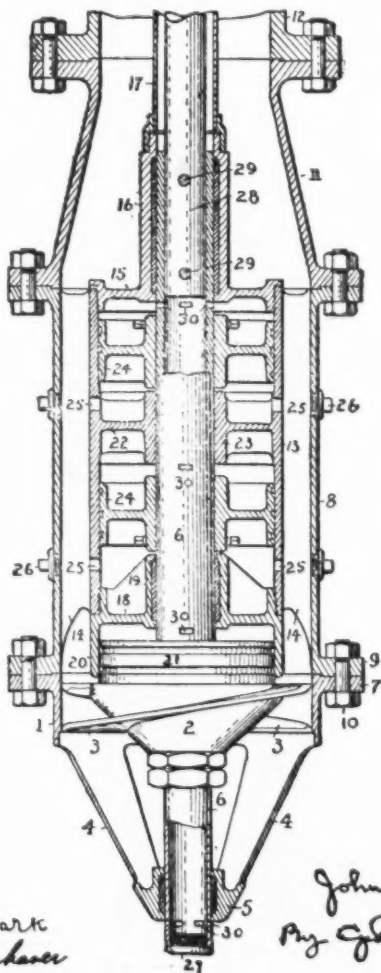
ARTHUR McLEAN,
CHAS. B. BURDICK.

Dr. 785,831.

PATENTED AUG. 11, 1902.

J. W. ALVORD.
HIGH SPEED ROTARY PUMP.
APPLICATION FILED DEC. 24, 1902.

NO. 1111111



Witnessed

Horris A. Clark
Geo. M. Carpenter

Subscribed

John W. Alvord
By *G. M. Carpenter*
Attorney

UNITED STATES PATENT OFFICE.

JOHN WATSON ALVORD, OF CHICAGO, ILLINOIS.

HIGH-SPEED ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 735,691, dated August 11, 1903.

Application filed December 24, 1902. Serial No. 136,465. (No model.)

To all who mit may concern:

Beit known that I, JOHN WATSON ALVORD, a citizen of the United States, residing at Chicago, in the County of Cook and State of Illinois, have invented certain new and useful Improvements in High-Speed Rotary Pumps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the figures of reference marked thereon, which forms a part of this specification.

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It has been proposed to balance the weight of such shafts and superimposed water column by the pressure of the water column in the uptake or delivery pipe.

My invention consists in certain novel constructions and arrangements of parts whereby this result can be effectively accomplished and automatically regulated. The shaft is journaled in bearings which permit it to have a certain amount of lengthwise play. Secured to the shaft is one or more pistons, which fits or fit in a cylindrical portion or portions of the stationary pump-casing and each forms one end of a chamber. The under side of the piston is exposed to the pressure of the water column in the uptake, while its upper side is subjected to the pressure in the chamber. There is an outlet from the chamber to the suction side of the pump, and this outlet is controlled by the lengthwise play of the shaft,

closing gradually as the shaft rises and opening when it falls. As there is a constant small leakage past the piston into the chamber, the pressure in said chamber tends to gradually increase, thus lessening the effective upward pressure on the under side of the piston. The shaft therefore moves slowly downward until it causes the outlet to open and relieve the pressure in the chamber, whereupon the fall of the shaft is checked. Thus by a series of constant adjustments and readjustments of the relative pressures on the two sides of the piston the differential pressure tending to lift the shaft is kept approximately constant, so that the shaft remains floating on the water column in substantially a constant position irrespective of the fluctuations in the actual pressure of the water column.

This invention is applicable to pumps having a great variety of impellers and can be carried out in many different ways. The accompanying drawing illustrates one mode of applying it to a rotary pump having a plain screw-impeller, the view being a longitudinal section of the pump.

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735,691

ly less in diameter than said body. away of the inner shell is a diaphragm 22, which is a bearing 23 for the shaft 6. This phragm divides the shell into two chambers, in each of which is a piston 24, secured to the shaft 6 and fitting the inside of the shell. Below each piston one or more holes are made in the shell, preferably by drill through both shells, the holes in the outer shell being afterward closed by screw-plugs.

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The operation of the pump is as follows: The impeller is rotated at high speed and raises the water up through the annular space between the outer and inner shells of the body-section 8 of the casing. The water issues freely through the holes 25, and the pressure due to the weight of the rising water column in the uptake-pipe is thus transmitted to the under side of the pistons 24. By properly proportioning the area and number of said pistons to the total weight of the rotating parts and the superimposed water column said weight can be balanced by the lift on the pistons. Hence no stop-bearing is required for the shaft. There is a little leakage of water past the pistons into the chambers above them, and this water in time fills the chambers. In order to prevent it from acquiring a pressure equal to that on the under side of the pistons, and thus neutralizing the lifting effect of the water column, the ports 30 are so arranged with reference to the stationary shaft-bearings that when the pressure in the chambers reaches a predetermined limit the consequent drop of the shaft will bring said ports below said bearings, thus permitting the water in the chambers to enter the tubular shaft and escape through the lower ports into the well on the suction side of the impeller. By closing the lower end of the shaft and providing the lower set of ports I form an intermediate chamber between the casing and the well, and thus prevent too sudden changes of pressure in the chambers; but as soon as sufficient water has escaped to permit the resultant increased pressure on the under side of the piston to lift the pistons and shaft the ports will be closed and the equilibrium reestablished. The shaft, pistons, and impeller thus have a constant slight motion up and down as these adjustments of pressure occur. It will be noted that they are independent of the actual pressure in pounds per square inch, since the balancing effect is due to the dif-

ferential pressure on the under side of the piston and not to the actual pressure of the water column. It will also be noticed that 70 by means of the piston 21 and its chamber and escape-ports the area of the impeller subjected to a downward pressure is no greater than that of its blades and that this is partially balanced by the upward pressure of 75 the water column on so much of the conical body of the impeller as lies above the blades.

I am aware that it has been proposed to provide the shaft of a rotary pump with a balancing-piston and to utilize the water leak- 80 ing past said piston to lubricate the adjacent shaft-bearing; but my invention aims to utilize the leakage to set up a differential pressure on the under side of the piston, so as to automatically balance the rotating parts irre- 85 spectively of the height of the water column—a result not possible in the aforesaid proposed construction.

I claim—

1. In a rotary pump, the combination with 90 an upright axially-movable shaft, of a balancing-piston secured thereto and having its under side exposed to the pressure of the water column, a stationary casing containing a chamber above said piston, and means con- 95 trolled by the axial movement of the shaft for permitting the escape of water from said chamber to the suction side of the pump, and thus regulating the pressure in said chamber.

2. In a rotary pump, the combination with 100 an upright axially-movable shaft, of a stationary casing containing a chamber concentric with said shaft and having means to admit the pressure of the water column in the uptake, a piston secured to said shaft and fitting the walls of said chamber, and escape- 105 ports above said piston controlled by the axial movement of said shaft.

3. In a rotary pump, the combination with an upright axially-movable tubular shaft, of 110 a stationary casing containing a chamber concentric with said shaft and having holes in its walls, a piston secured to said shaft and fitting the walls of said chamber above said holes, and escape-ports in said shaft above 115 said pistons.

4. In a rotary pump, the combination with an upright axially-movable tubular shaft, of a stationary casing comprising two concentric shells, the inner one being closed at the 120 top and bottom and having holes in its walls, one or more pistons in said inner shell above said holes and secured to said shaft, and escape-ports in said shaft above said pistons, controlled by the axial movement of said 125 shaft.

5. In a rotary pump, the combination with an upright axially-movable tubular shaft, of a stationary casing comprising two concentric shells, the inner one having a diaphragm 130 and provided with holes in its walls above and below said diaphragm, heads closing the top and bottom of said inner shell, shaft-bearings in said heads and diaphragm, pistons

secured to said shaft above said holes, and escape-ports in said shaft adjacent to the lower ends of said bearings.

5 6. In a rotary pump, the combination with an axially-movable tubular shaft having its lower end closed and provided with ports of a bearing adjacent to and above said ports, a balancing-piston secured to said shaft and having its under side exposed to the pressure
10 of the water column, a stationary casing containing a chamber for said piston, and means for putting said chamber in communication with the interior of said shaft when the resultant pressure on the under side of the piston falls below a predetermined limit.

15 7. In a rotary pump, the combination with a stationary casing comprising two concentric shells, of a shaft concentric with said shells, an impeller on the shaft having a conical body carrying a piston fitting a chamber at the lower end of the inner shell, means for

permitting the escape of leakage-water from said chamber to the suction side of the pump, and a balancing-piston in the inner shell exposed underneath to the pressure of the water column and above to the pressure in a chamber in said shell.

8. In a rotary pump, the combination with a stationary pump-casing, of an impeller, its shaft, a balancing-piston secured on the shaft, a casing surrounding said piston and communicating below the piston with the uptake, and means for automatically regulating the pressure on the top of the piston, whereby the differential pressure on its under side will remain substantially constant.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN WATSON ALVORD.

Witnesses:

ARTHUR McLEAN,
CHAS. B. BURDICK.

Defendants' Exhibit "A-3."

[Endorsed]: In the United States District Court, Northern District of California, Southern Division. In Equity—No. 485. Layne & Bowler Corporation, Plaintiff, vs. Western Well Works, Inc., a Corporation, et al., Defendants. Defendants' Exhibit "A-3." Hattie B. Lehman, Notary Public.

Filed Sep. 2, 1920. W. B. Maling Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monckton, Clerk.



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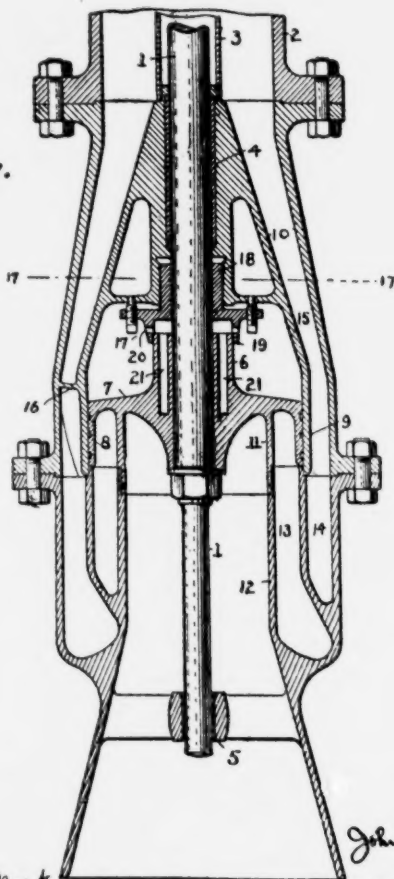
PATENTED AUG. 11, 1903.

J. W. ALVORD.
HIGH SPEED ROTARY PUMP.
APPLICATION FILED MAR. 20, 1903.

NO MODEL

8 SHEETS—SHEET 1.

Fig. 1.



Witnesses
James A. Elger,
Richard H. Hughes.

My

Inventor
John W. Alvord,
C. J. Whitney
Attorney

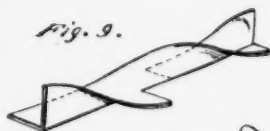
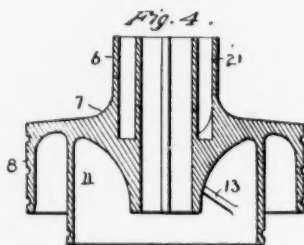
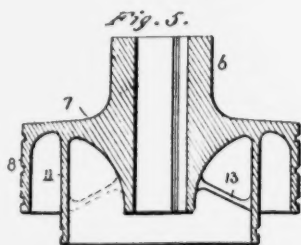
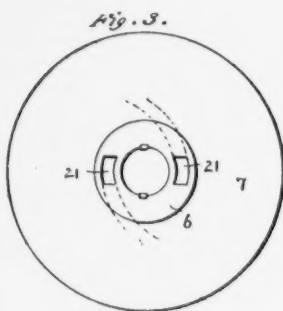
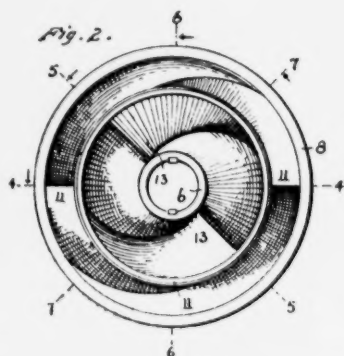
No. 735,692.

PATENTED AUG. 11, 1903.

J. W. ALVORD.
HIGH SPEED ROTARY PUMP
APPLICATION FILED MAR. 30, 1903.

NO MODEL.

8 SHEETS—SHEET 2.



Witness
James A. Clark
Richard W. Tucker

Inventor
John W. Alvord
Geo. W. Alvord
Attorney

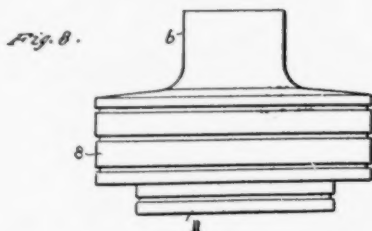
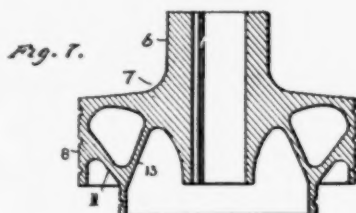
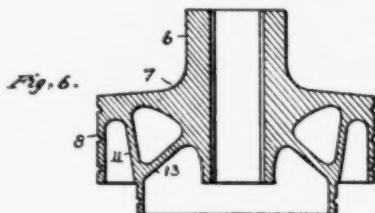
No. 735,692.

PATENTED AUG. 11, 1903.

J. W. ALVORD.
HIGH SPEED ROTARY PUMP.
APPLICATION FILED MAR. 30, 1903.

NO MODEL

9 SHEETS—SHEET 3.



Witnesses

James A. Clark.
Richard W. Clark.

By

John W. Alvord
J. W. Alvord
Attorney

No. 735,692

PATENTED AUG. 11, 1903.

J. W. ALVORD.
HIGH SPEED ROTARY PUMP.
APPLICATION FILED MAR. 30, 1903.

NO MODEL

2 SHEETS—SHEET 4.

Fig. 10.

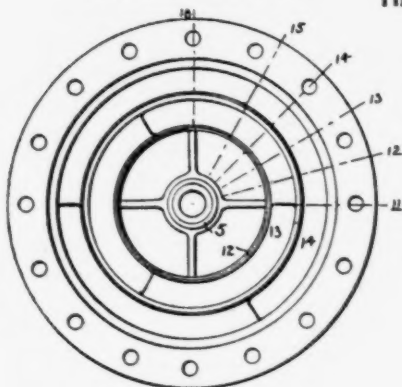
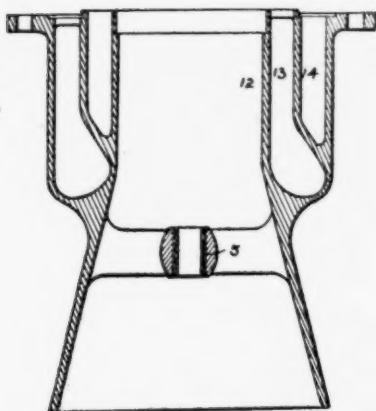


Fig. 11.



Inventor

John W. Alvord,

James H. Stewart
Attorney

Witnesses

James H. Clark
Richard H. Cooper

24,

No. 735,692.

PATENTED AUG. 11, 1903.

J. W. ALVORD.
HIGH SPEED ROTARY PUMP.
APPLICATION FILED MAR. 30, 1903.

NO MODEL.

9 SHEETS—SHEET 9.

Fig. 12.

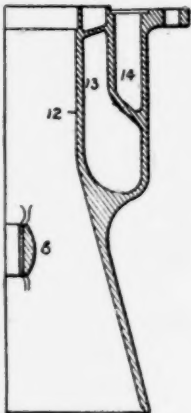


Fig. 13.

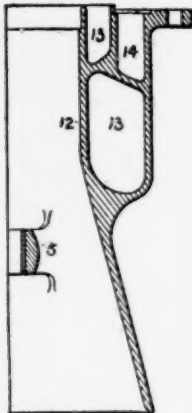


Fig. 14.

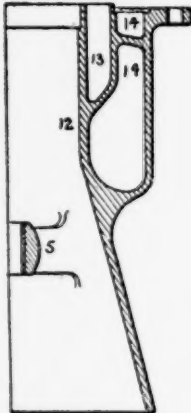


Fig. 15.

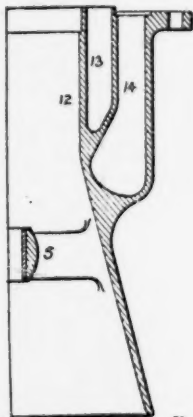
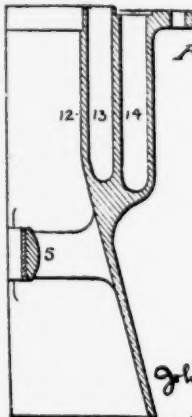


Fig. 16.



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James A. Day & Co.
Richard H. Cropper

Fig. 17

Inventor

John W. Alvord

Geo. W. Whittey
Attorney

No. 735,692.

PATENTED AUG. 11, 1903.

J. W. ALVORD.
HIGH SPEED ROTARY PUMP.
APPLICATION FILED MAR. 30, 1903.

NO MODEL

8 SHEETS—SHEET 6

Fig. 17.

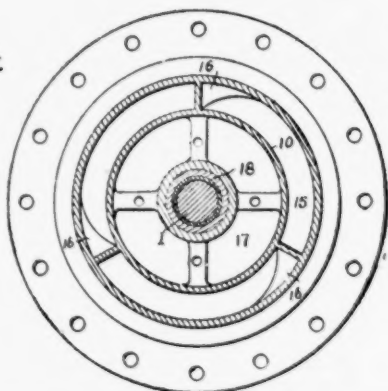


Fig. 18.

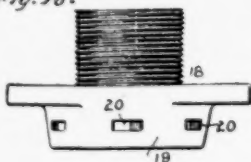


Fig. 19.

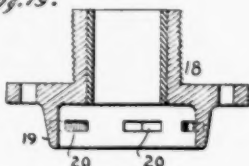
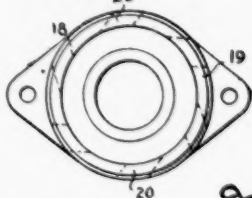


Fig. 20.



Inventor

John W. Alvord,
Gustavus W. Alvord

Witnesses

Monroe A. Elger,
Richard W. Cooper

No. 735,692.

PATENTED AUG. 11, 1903.

J. W. ALVORD.
HIGH SPEED ROTARY PUMP.
APPLICATION FILED MAR. 30 1903.

NO MODEL

8 SHEETS—SHEET 1

Fig. 21.

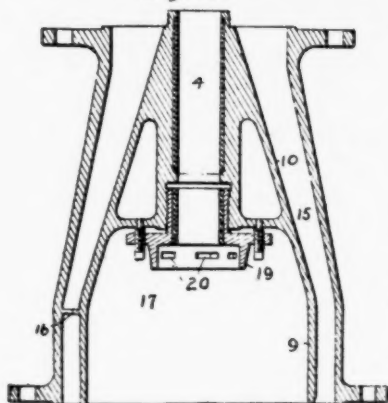


Fig. 23.

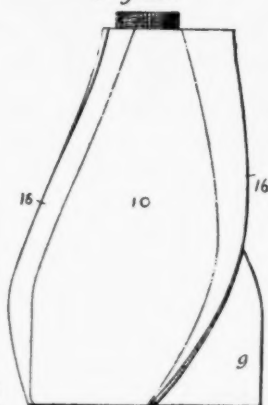


Fig. 22.

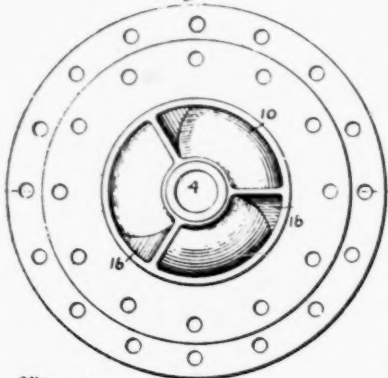
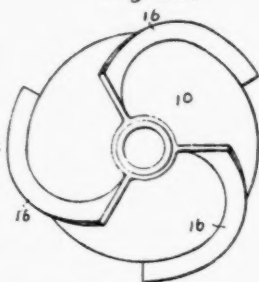


Fig. 24.



Witnesses
James A. Clark
Richard H. Tucker

Inventor
John W. Alvord
G. W. Whitney
Attorney

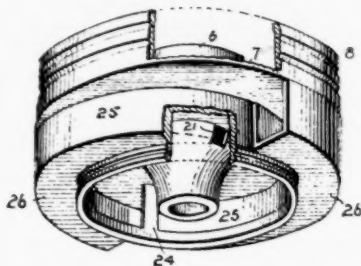
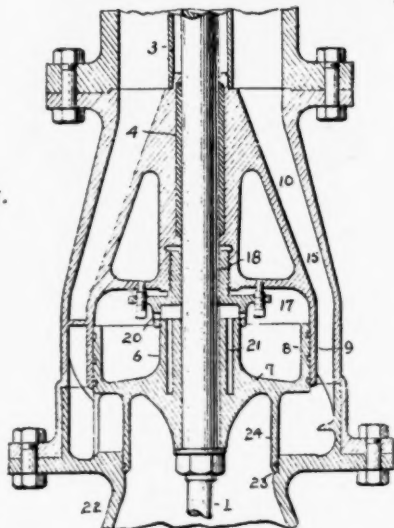
No. 735,692.

PATENTED AUG. 11, 1903.

J. W. ALVORD.
HIGH SPEED ROTARY PUMP.
APPLICATION FILED MAR. 30, 1903.

NO MODEL

• ENCLTS-SHEET 3.



September

John W. Alvord
Geo. Whitney

*Sifuentes

Louis A. Clark
 Richard H. Tucker

254

No. 735,692.

Patented August 11, 1903.

UNITED STATES PATENT OFFICE.

JOHN WATSON ALVORD, OF CHICAGO, ILLINOIS.

HIGH-SPEED ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 735,692, dated August 11, 1903.

Application filed March 30, 1903. Serial No. 150,184. (No model.)

To all whom it may concern:

Be it known that I, JOHN WATSON ALVORD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in High-Speed Rotary Pumps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which forms a part of this specification.

This invention relates to high-speed rotary pumps for deep wells, by which I mean wells a hundred feet or more in depth. In such wells the rotary pump is located far below the surface of the ground, being operated by an upright shaft rising to the surface and there driven by some suitable motor. In deep wells the weight of this long shaft and its attached parts is very great, and many schemes have been proposed for supporting it or for counterbalancing it.

My invention relates to that mode of counterbalancing which utilizes the hydrostatic pressure of the rising column of water in the uptake or delivery-pipe of the pump. In order to cause this column to exert a lifting effect upon the shaft and its attached parts, I so construct the impeller that the water column is reversed in direction in passing through the impeller, so that at the point where the water leaves the impeller it is flowing downward, being subsequently reversed again in passing through the impeller-casing, so as to thereafter pursue an upward course into the uptake. The hydrostatic reaction on the impeller at the point of delivery therefrom is sufficient to lift and sustain all the rotating parts. In order to automatically regulate the lifting effect within predetermined limits, so as to maintain the shaft and impeller in substantially the same position while running, I provide above the impeller a chamber into which the water under pressure can leak past the periphery of the impeller. When the pressure in this chamber reaches a given value and the consequent differential pressure on the under side of the impeller has been lessened to the predeter-

mined limit, the impeller and shaft will drop slightly, thereby opening an escape-port and relieving any excess of pressure in the chamber, so as to keep the differential balancing pressure at about the same point at all times irrespective of the fluctuations in the actual pressure of the water column. In another form of impeller the water column is not completely reversed, but is diverted from an upright longitudinal direction in the casing to a radially-lateral direction while passing through the impeller and is then turned upward again through the upper part of the casing. This impeller is provided with the same balancing-chamber and escape-ports automatically controlled by the rise and fall of the impeller as have been described in connection with the reversing-impeller.

It will be readily understood that other forms of impeller may be employed, but they must be such as to produce an upward hydrostatic pressure on the under side of the impeller, and this must be partially balanced by leakage-pressure in a chamber controlled by the longitudinal movement of the impeller due to the slight variations in the differential pressure.

In the accompanying drawings, Figure 1 is a longitudinal section of the reversing-impeller and its casing. Fig. 2 is a bottom plan view of the impeller. Fig. 3 is a top plan view of the same. Figs. 4, 5, 6, and 7 are diametrical sections of the same on the correspondingly-numbered lines in Fig. 1. Fig. 8 is a side elevation of said impeller. Fig. 9 is a perspective view of a development of the web and flange-wall of the impeller. Fig. 10 is a top plan view of the lower section of the casing. Figs. 11, 12, 13, 14, 15, and 16 are radial sections of the same on the correspondingly-numbered lines in Fig. 10. Fig. 17 is a top plan view of the upper section of the casing. Fig. 18 is a side elevation of the gland for the stuffing-box on a larger scale. Fig. 19 is a diametrical section of the same. Fig. 20 is a bottom plan view of the same. Fig. 21 is a diametrical section of the upper section of the casing. Fig. 22 is a top plan view of the same. Fig. 23 is a side elevation of the inner shell of the same and the radial helical partitions. Fig. 24 is a top plan view of the same. Fig. 25 is a

longitudinal section of the radial impeller and its casing. Fig. 26 is a perspective view of said impeller partly broken away.

The rotatable pump-shaft 1 passes down through the uptake or delivery-pipe 2, being preferably inclosed in a casing 3. The shaft has bearings 4 5 in the upper and lower sections of the casing respectively. In the lower ends of the upper section is located the impeller, which is a circular structure concentric with the shaft, to which it is firmly keyed or otherwise secured. The impeller has a hub 6, surrounded by a disk-shaped body 7, which is provided with a peripheral flange 8, containing packing-grooves and fitting snugly inside the cylindrical lower end 9 of the inner shell 10 of the upper section of the casing. Said cylindrical end 9 is long enough to allow the impeller to have a certain amount of longitudinal play.

Referring now especially to the figures of the drawings illustrating the reversing-impeller, it will be seen that between the hub and the periphery of the impeller is a cylindrical flange 11 extending preferably downward below the bottom of the flange 8 and having a rotating fit inside the upper end of the inner shell 12 of the lower section of the casing. The joint is preferably a rabbeted one, as shown, and the flange 11 has a water-packing groove in it. At certain points, preferably two, a web 13 connects the flange 11 with the hub, whose surface below the disk 7 is preferably tapering and concave, as shown. The outer edge of the web 13 remains always in the same transverse plane, but its inner edge rises in a regular helical line along the surface of the hub, departing farther and farther from the center as it rises until it reaches a point longitudinally in line with the flange 11. That portion of said flange above the plane of junction with the web also veers outwardly, similarly to the web, so that a space of substantially uniform cross-section is maintained between them, the flange-wall moving downward as the web rises until at the point where the web assumes a position parallel with the axis of the hub the flange-wall becomes horizontal and terminates. The relative positions of the web and flange-wall are illustrated in Fig. 9, which is a perspective view of them as they would look straightened out instead of following the circular contour of the hub, as they actually do. In the drawings two webs are shown starting at diametrically opposite points and each continuing for three-eighths of the circumference of the hub. It will be seen from this construction that the water rising through the supply passage in the inner shell 12 will be continuously lifted by the radial edges of the two webs and carried from a point inside the inner shell and flange 11 first upward, then outward, and finally downward to a point outside the flange 11 and between it and the peripheral flange 8. Here it enters an annular cham-

ber in the lower section of the casing concentric with the supply-passage 12. The walls of this chamber 14 are twisted on helical lines in a fashion similar to the web and flange-wall of the impeller, so that the stream of water is carried first downward, then outward, and then upward through an outer concentric annular chamber 14'. By a careful study of Figs. 11 to 16, noting that they are successive radial sections of Fig. 10 through a quarter of its circumference, it is thought that the course and operation of the chamber-walls will be understood. From the outer chamber 14' the water passes up through the annular space 15 between the inner and outer shells of the upper section of the casing, whence it flows into the uptake. In order to counteract the rotary motion of the water as it issues from the chamber 14', the space 15 is divided into segments by helical radial partitions 16, uniting the two concentric shells of the upper casing-section and so inclined as to check the whirl of the water and send it into the uptake in substantially longitudinal lines.

It will be seen that at the point in the impeller where the water is reversed from an upward to a downward direction there will be an upward hydrostatic pressure due to the weight of the water column in the uptake. This pressure tends to lift the impeller and its shaft, and by properly proportioning the parts this lift can be made to counterbalance the rotating parts, so that the shaft will require no step-bearing, but will float, as it were, on the water. In order to regulate this counterbalancing effect so as to maintain the impeller automatically in substantially the same position irrespective of the fluctuations in the water-pressure, I provide above the disk of the impeller a chamber 17, formed inside the inner shell of the upper section of the casing. At its upper end the chamber is made water-tight by a stuffing-box surrounding the shaft 1. The gland 18 of the stuffing-box is flanged, forming a cup to receive the upper end of the hub 6 of the impeller, which has a snug fit in the flange 19. Through said flange are cut ports 20, and the longitudinal motion of the hub inside the flange will open and close these ports. One or more escape-ducts 21 are made through the impeller from the upper end of the hub to points below the disk 7 and opening into the supply-passage 12.

In the operation of the pump the pressure of the water column causes a certain leakage of water past the periphery of the impeller into the chamber 17. As this leakage accumulates in the chamber it counteracts the lifting effect of the pressure on the under side of the impeller, and if allowed to go on unregulated it would soon become so great as to balance that pressure and destroy the value of the water column as a balancing agent for the rotating parts. The ports 20 are therefore so located that when the back pressure in the chamber 17 reaches a predetermined

point, at which the differential pressure on the disk of the impeller is just sufficient to properly balance the rotating parts, then the downward movement of the impeller has been sufficient to open the ports 20 and permit an escape of all subsequent leakage into the chamber to the suction side of the impeller. The device is thus self-regulating, and the impeller will maintain its normal position irrespective of the actual pressure of the water column in the uptake. This automatic regulating action is also secured by the impeller shown in Figs. 25 and 26, which operates by forcing the water outward in radial lines into the lower end of the upper section of the casing. Said upper section is similar to that used for the reversing-impeller; but the lower section is less intricate, being merely a pedestal 22, containing a lower bearing for the shaft 1 and having at its upper end a cylindrical shoulder 23, into which fits a cylindrical packed flange 24 on the impeller. The peripheral flange 8 on the impeller extends upward instead of downward, as in Fig. 1. Under the disk 7 are one or more eccentric webs 25, beginning at the flange 24 and ending at the periphery of the disk and joined to the flange by horizontal plates 26. When two such webs are used, as shown in the drawings, they each run half-way around the impeller. When this impeller is rotated, these webs, whose inner ends are in advance, continuously cut the water and force it radially outward into the upper section of the casing, where it passes up through the compartments between the helical partitions, and so on to the uptake. The hydrostatic pressure of the water column is exerted inwardly on the webs and upwardly on the disk and plates. The water leaking past the flange 8 is received in the chamber 17, and its escape is regulated by the ports 20 and the ducts 21 and hub 6, just as in the case of the reversing-impeller hereinbefore described.

In using these pumps in deep wells I place two or more of them at different depths, each delivering water into a common uptake, or I may arrange them tandem, all acting on the same water column, so that the lower pumps each deliver into the one next above.

Having thus described my invention, what I claim is—

1. In a rotary pump, the combination with an impeller having its under side exposed to the hydrostatic pressure of the water column in the uptake, of a casing having a chamber above said impeller and in which said impeller is free to move longitudinally, and means controlled by the impeller for regulating the pressure in said chamber.

2. In a rotary pump, the combination with an impeller having its under side exposed to the hydrostatic pressure of the water column in the uptake, of a casing containing a leakage-chamber above said impeller, and means

controlled by the impeller for regulating the escape of leakage-water therefrom.

3. In a rotary pump, the combination with an impeller having its under side exposed to the hydrostatic pressure of the water column in the uptake, of a casing containing a leakage-chamber above said impeller, and means whereby the longitudinal movement of said impeller automatically regulates the escape of leakage-water from said chamber.

4. In a rotary pump, the combination with an impeller having its under side exposed to the hydrostatic pressure of the water column in the uptake, of a casing fitting the periphery of said impeller and forming a chamber above it, and escape ports and ducts leading from said chamber and controlled by the longitudinal movement of said impeller.

5. In a rotary pump, the combination with an impeller having its under side exposed to the hydrostatic pressure of the water column in the uptake, of a casing forming a chamber above said impeller, a cupped element in said chamber into which the hub of the impeller enters, ports in said cupped element controlled by said hub, and escape-ducts through said impeller.

6. In a rotary pump, the combination with an impeller having its under side exposed to the hydrostatic pressure of the water column in the uptake, of a casing forming a chamber above said impeller and in which said impeller is free to rise and fall, a stuffing-box for the shaft in said chamber, having a gland provided with a flange containing ports and fitting the upper end of the impeller-hub, and escape-ducts extending from the upper end of said hub to the suction side of the impeller.

7. In a rotary pump, the combination with an impeller having its under side exposed to the hydrostatic pressure of the water column in the uptake, of means for automatically confining the water which exerts a pressure on the upper side of the impeller, and means for automatically governing the escape of said water, so as to produce a differential pressure on the under side of the impeller substantially equal to the weight of the rotating parts.

8. In a rotary pump, the combination with an impeller having its under side exposed to the hydrostatic pressure of the water column in the uptake, of means for automatically confining the water which exerts a pressure on the upper side of the impeller, and means for automatically governing the escape of said water, so as to produce a differential pressure on the under side of said impeller substantially equal to the weight of the rotating parts, and means for maintaining said differential pressure constant.

9. A rotary pump having an impeller provided with a concentric flange one or more portions of which veer outwardly from a longitudinal to a radial position, and one or more webs extending between said flange and the

hub of the impeller and running from a radial to a longitudinal position simultaneously with the change in the flange, and forming with the impeller a passage substantially constant in cross-section.

10. In a rotary pump, the combination with an impeller adapted to reverse the flow of the water, of a casing having concentric communicating passages arranged to reverse the flow of the water again.

11. In a rotary pump, the combination with an impeller delivering the water downwardly, of a casing having concentric passages adapted to receive and reverse the flow of water.

12. In a rotary pump, the combination with an axially-movable impeller adapted to deliver the water downwardly, of a casing having concentric passages arranged to reverse the flow of water, and means for automatically counterbalancing the upward reaction on the impeller.

13. In a rotary pump, the combination with an axially-movable impeller delivering the water downwardly, of a casing containing a leakage-chamber above said impeller, and means controlled by the impeller for regulating the escape of leakage-water from said chamber.

14. In a rotary pump, the combination with an axially-movable impeller delivering the water downwardly, of a casing containing a leakage-chamber above said impeller, and means whereby the axial movement of the impeller automatically regulates the escape of leakage-water from said chamber.

15. In a rotary pump, the combination with an axially-movable impeller delivering the water downwardly, of a casing fitting the periphery of said impeller and forming a chamber above it, and escape ports and ducts leading from said chamber and controlled by the axial movement of said impeller.

16. In a rotary pump, the combination with an impeller delivering the water downwardly, of a casing forming a chamber above said impeller, a cupped element in said chamber into which the hub of said impeller enters, ports in said cupped element controlled by said hub, and escape-ducts through said impeller.

In testimony whereof I affix my signature in presence of two witnesses.

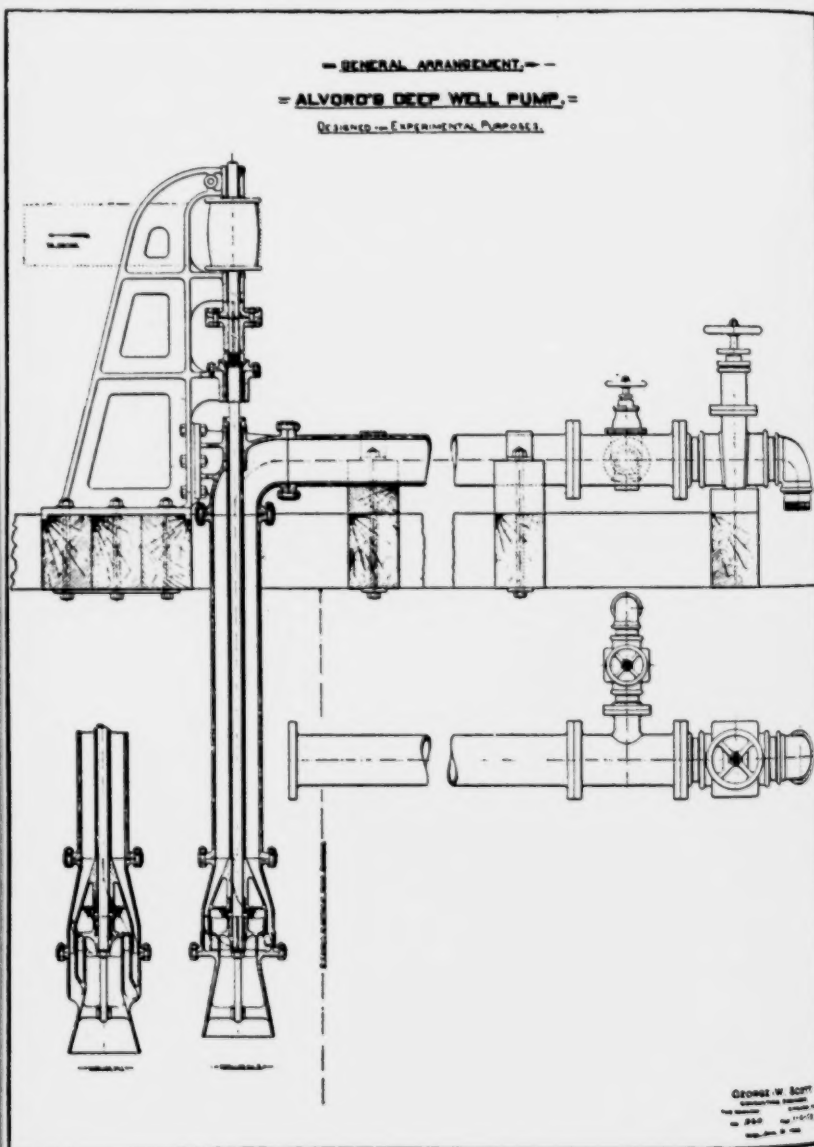
JOHN WATSON ALVORD.

Witnesses:

R. L. OTWELL,

V. K. MORRIS.

Defendants' Exhibit "A-10."



[Endorsed]: In the United States District Court, Northern District of California, Southern Division. In Equity—No. 485. Layne & Bowler Corporation, Plaintiff, vs. Western Well Works, Inc., a Corporation, et al., Defendants. Defendants' Exhibit "A-10." Hattie B. Lehman, Notary Public.

Filed Sep. 2, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Mouckton, Clerk.

Defendants' Exhibit "D."

UNITED STATES OF AMERICA,
DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, GREETING:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the File Wrapper and Contents, in the matter of the

Letters Patent of
MAHLON E. LAYNE.

Number 821,653, Granted May 29, 1906.
for

Improvement in Well Mechanism.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at Washington, in the District of Co-

lumbia, this 23d day of August, in the year of our Lord one thousand nine hundred and twenty, and of the Independence of the United States of America the one hundred and forty-fifth.

[Seal]

M. H. COULSON,

Acting Commissioner of Patents.

Case 6.

1903.

Number (Series of 1900.)

154,704.

229.

(Ex'rs Book)

~~55-12~~
50-837

PATENT No. 821,653.

Name Mahlon E. Layne.

of Houston.

County of _____

State of Texas.

Invention

Well Mechanism.

Division of App. No....., filed....., 190..

PARTS OF APPLICATION FILED.

ORIGINAL.

RENEWED.

| | | |
|-----------------------|----------------|-------|
| Petition, | April 28, 1903 | , 190 |
| Affidavit, | " " , 1903 | , 190 |
| Specification, | " " , 1903 | , 190 |
| Drawing 4 Shts. | " " , 1903 | , 190 |
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| " " Cert. | 190 | , 190 |
| App. filed complete | Apl. 28, 1903 | , 190 |

vs. Layne & Bowler Corporation. 959

Examined F. M. Tryon, Ex., Oct. 30, 1905 ,190
Countersigned, J. W. Melsey, ,190
For Commissioner ,190
For Commissioner.
Notice of Allowance, Nov. 6, 1905 ,190
Final Fee Cash # W. May 4, 1906 ,190
" " Cert. ,190 ,190
Patented May 29, 1906
Associate Attorney,

Attorney PAUL SYNNESTVEDT,
518 Frick Bldg.,
Pittsburg,
Pa.

Name Serial Number
Patent No. Date of Patent.

3

154,704.

154,704 No. $\frac{1}{2}$

Law Offices of

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Pittsburgh, Pa.—Chicago, Ill.

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Cable Address, PAULSYN.

PAUL SYNNESTVEDT,

Counselor at Law and Expert in Patent Causes.

PAUL CARPENTER,

Patent Attorney.

\$15 00. Received

Apr.

28

1903.

960 *Western Well Works, Inc., et al.*

ck. F.

Chief Clerk U. S. Patent Office.

Pittsburgh, April 27, 1903.

Hon. Commissioner of Patents,

Washington, D. C.

Sir:

Herewith I hand you my check #7091 for \$15 to cover the Government filing fee in the application of Mahlon E. Layne for patent on Well Apparatus (Case #6). The petition, specification and oath are attached hereto, and the drawings (4 sheets) are sent by separate mail.

Very respectfully,

PAUL SYNNESTVEDT,

Per C. H. EBERT.

154,704.

1

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Cable Address, PAULSYN.

PAUL SYNNESTVEDT,

Counselor at Law and Expert in Patent Causes.

PAUL CARPENTER,

Patent Attorney.

Mail Room. U. S. Patent Office. Apr. 28, 1903.

PETITION.

To The Commissioner of Patents:

Your Petitioner, Mahlon E. Layne, a citizen of

the United States of America, residing at Houston, County of Harris and State of Texas (his postoffice address being Houston, Texas), prays that Letters Patent may be granted to him for the new and useful improvements in

WELL MECHANISM (Case 6)

set forth in the annexed specification; and he hereby appoints PAUL SYNNESTVEDT (Registry No. 106-#518 Frick Building, Pittsburg, Pa.), his attorney, with full powers of substitution and revocation, to sign his name to the drawings, to prosecute this application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent Office connected therewith.

MAHLON E. LAYNE.

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OATH.

State of Illinois,
County of Cook,—ss.

Mahlon E. Layne, the above-named petitioner, being duly sworn, deposes and says, that he is a citizen of the United States of America, residing at Houston in the County of Harris and State of Texas, and that he verily believes himself to be the original, first and sole inventor of the new and useful improvements in

WELL MECHANISM

described and claimed in the annexed specification; that he does not know and does not believe that the same was ever known or ever used before his inven-

tion or discovery thereof; or patented or described in any printed publication before his invention or discovery thereof, or more than two years prior to this application; or in public use or on sale in the United States for more than two years prior to this application; and that no application for patent on the said invention has been filed by him or his legal representatives or assigns in any country foreign to the United States.

MAHLON E. LAYNE.

Sworn to and subscribed before me, this 3d day of April, A. D. 1903.

[Seal]

PAUL CARPENTER,

Notary Public in and for the County in the State aforesaid.

153704.

3.

Case 6.

SPECIFICATION.

TO WHOM IT MAY CONCERN:

Be It Known That I, MAHLON E. LAYNE, a citizen of the United States, residing at Houston, County of Harris and State of Texas, have invented certain new and useful improvements in

WELL MECHANISM,

of which the following is a specification.

My invention relates to the apparatus used for drawing water from driven or artesian wells, and particularly to the means for adjusting a pump therein. The objects of the invention are, to provide means by which the piping and the pump may

be all assembled in proper shape before inserting it into the well; to provide means by which a pump may be placed in any desired position in a well, centered, raised or lowered and fixed in position by manipulating from the outside entirely; to provide means for adjusting the length of the piping leading from the pump to the surface at will and to lower the pump from time to time without taking it out of the well; to provide improved means for centering and fixing the pump in proper position in the well casing; to provide improved means for manipulating the packing of the pump shaft, and proper adjustment of the pump in place by means at the surface of the ground; to provide for the proper action of a pump without stopping up the well, so that water may be either flowed into or pumped out of the same at pleasure; to provide a superior mounting for a centrifugal pump in the well, manipulated from the surface of the ground; to provide an extensible pump shaft separately supported at intervals along its length; to provide an automatic centering device for the pump in the well; to provide for mounting the pump and the shaft in a closed casing which is open to operate from the top; to obviate the necessity of making large wells for descending into them in order to ar-

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range the pump, and to generally improve and cheapen the apparatus used for the above purposes.

The above objects, as well as other advantages which will hereinafter appear, I attain by means of the construction and assemblage of parts as illus-

trated in preferred forms in the accompanying drawings, wherein—

Figure 1 represents a section of a well showing the preferred form of my apparatus in place therein.

Figures 2, 3 and 4 are horizontal sections of the shaft casing respectively taken on line 2 of Figure 1, and lines 3 and 4 in Figure 5.

Figure 5 is an enlarged central vertical section taken through the pump and the casing of the well.

Figure 6 is a horizontal section of Figure 5 taken along the line 6.

Figure 7 is a section of a top of the well casing containing the pump shaft and its mounting: Figure 8 is a similar section taken at one of the joints of the pump shaft casing.

Figure 9 is a section taken through the casing containing the pump shaft at the collar 28 in Figure 1.

Figure 10 is a vertical section of a well having a modified form of the apparatus therein.

Figure 11 is a side view and partial section of a centrifugal pump mounted by a modified method.

Figure 12 is a half plan and half section of the pump shown in Figure 11, taken along the line 12 therein.

Figure 13 is a partial vertical section taken through the shafting and its mounting shown in Figure 10 at the point marked 68.

For convenience of illustration the apparatus is shown as applied to a well which passes through two water bearing strata separated by an impervious stratum, the top surface of the ground being

also an impervious layer of earth. The upper
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chamber 15 of the well may be protected by wooden framing as customary, or it may be but a continuation of the chamber enclosed by the casing 16, which may be carried to the surface if desired, and the chamber 15 dispensed with. Below this is a screen 17 in the sand layer, and still below the screen 17 is another casing 18, into which extends the suction pipe 22, from the pump 21, and below this another screen 19.

In the approved form as illustrated in Figure 1, I use a centrifugal pump 21, single or in a series, as may be desired, and having a top discharge. It is attached to a casing 20, which runs to the top of the well and encloses the driving shaft 39 of the pump, which may be driven by a pulley 25, mounted in the framework 24, in any approved manner. An outlet pipe 23 leads from the pump to the surface to carry off the water. As shown in Figure 2, the shaft casing 20, and the outlet pipe 23, are bound together by means of the block-and-strap arrangement 26. These connecting devices are distributed at intervals along the length of the shaft casing. In order to previously assemble all the parts and then put the pump into the well and fix it in position therein, I provide a system of wedges 33, which serve to fix the pump in place and hold it in the proper vertical position, designed to be operated by means from the top of the well, avoiding the necessity of a man's going into the well in order to fix the pump in place. Pivoted to an extension on the

head of the centrifugal pump, casing 37, I provide a series of toggle links 34, which are carried in slots in the extension 36 of the casing, and at their outer ends bear wedge blocks 35, which embrace and co-operate with the vertically movable wedges 33, placed against the casing 16. The wedges 33 may be attached to links 39, which are carried by a sliding collar 28 on the casing 20, the collar 28 being operated by a rod 27, which runs to the top of the well, so that from the top the wedges 33 may be raised and lowered into place and can be tightened

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therein. The toggle links may be also connected by links 32, to a collar 31, and the collar 31 to a rod 30, which extends to the top of the well as before, in order to manipulate it without going into the well. Thus in order to obtain greater power and fix the wedges more securely in place, it will be observed that by pulling up on the rod 32, the toggle links 34 will cause the wedge blocks 35 to press with great power against the wedges 33, and thus fix the pump casing in place wherever desired.

The pump shaft 39 is enclosed in a shaft casing 20, which latter is made in joints and may be of any desired length. The pump shaft also is made in sections, 39, 39' 39'', which are attached together by means of sliding keys so as to allow of some vertical play with relation to each other. From Figure 5 it will be seen that the shaft 39 passes through a block 47, and at its top is fixed in the bearing block 48 by means of the pin 50, as shown in Figure 4. The next section of the shaft, 39', is inserted into the

block 48, and prevented from rotating by means of the key 49, which is splined therein. The weight of the shaft and pump below the block 47 is carried by the block 48; and from Figure 8 it will be seen that a similar arrangement is made at the top of the next section of the shaft casing, where the block 47' supports the weight of the section of shaft 39' by means of the collar 48', connected by a pin and key as before.

At the top, the casing 20 is closed and is provided with a stuffing-box 50, closed by the cap 51, at the top of the shaft 39". The shaft 39 is fixedly keyed to the vanes 38 of the centrifugal pump, and below the pump casing 21 is a pipe 22, which extends down below the water level and is extended any desired depth in the well.

The casing 20 also contains a tubular rod 44, which has a bearing in the block 47 on top of the pump casing 37, as shown in Figure 5, and is pro-

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vided with a square opening which co-operates with the head of the screw 42, used for adjusting the cap 41 of the packing box 40 for the pump, and compressing the packing in place. In order that this cap 41 may be raised and lowered evenly, the screw 42 is provided with a sprocket wheel, and two other screws of a similar kind are distributed about the cap, as shown in Figure 6, and connected by means of the sprocket chain 46, so that by means of the tubular shaft 44, all three of said screw 42 may be turned at once to compress the packing in box 40.

This pipe is tubular shaft 44 also serves the purpose of providing convenient means for forcing the liquid out of the pump shaft casing. By forcing air in at the top of the casing 20, by means of the pipe 52, the liquid can be forced down to the bottom of said casing 20, and by means of the small opening 45, in the bottom of the tubular shaft 44, the fluid can be forced out at the top 54, and keep the casing clear in order to leave the bearings clean therein and not interfere with the working of the pump, or by forcing fluid in at the top 54, the operation will be reversed, and the fluid ejected from pipe 52.

It will be noticed that the weight of the pump and its shaft is supported at each end of the sections of the casing by the blocks 47, 47', etc. By reason of this arrangement the pump shaft and the shaft casing can be made in separable sections, and consequently the pump may be inserted at any desired depth and the parts assembled before putting them into the well. The wedge system illustrated for tightening the pump casing in place may also, if desired, be used to center it with respect to the casing. The outlet pipe 23 is also preferably made in sections to correspond with the sections of the pump shaft casing.

In Figures 10 to 13 I have shown a modified form of the apparatus which uses a simple series of wedges for fixing the pump in place, as illustrated

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best in Figure 11. The pump casing has a plat-

form 61, and a depending ring flange 66, and a series of wedges 63 are placed around the depending flange 66, and are connected to the top platform by means of a series of screws 65. A series of co-operating wedges 62 may also be provided, suspended from the platform 61 by means of the screw 64, and the two series of wedges surround the whole casing. It will sometimes be convenient to dispense with the outlet pipe 23, and extend the casing 16 to the top, to act itself as the conveying channel for the liquid. In each case, of course, the pump casing 21 and platform 61 will be made water-tight within the casing 16, and for this purpose the wedges 62 will be made in overlapping sections, in order to break the joints seen in Figure 12. The pumps will then deliver directly into the upper casing. It will be plain that by turning the screws 65, the bottom wedges are drawn upward against the wedges 62, by which the casing of the pump is fixed in any desired place and tightened in the well casing 16. The screws 65 may be operated by means of a socket wrench placed upon a long rod and reached from the surface of the ground, or may be extended to the surface of the ground, as desired.

In the case illustrated, the top of the pump shaft may be provided with a pulley 25, as before, and a bearing fixed on some part of the framework, as on the cross beam 57. Extending downward from the beam 57 may be provided a timber 56, and part way down a bearing and support providing for the casing of the pump shaft 60, by means of the block 67, which is carried upon a cross frame 68; and a packing box therein, 71, is closed by a screw 70, the whole

being attached to the timber 56 as shown in Figure 13. Below this point the shaft 39 may be enclosed in a casing 60, which is screwed in the block 67, as shown in said Figure. For additional security the block 67 may be attached to the timber 56, by means of the strap 69, which surrounds the

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same. The casing 60 may be in sections and of any desired length.

I prefer, generally, to allow for free flow of water down the well outside of the pump casing and the pump, in order that water may be drained into the well when desired, rather than pumping the water out; which I attain by dropping the wedges 63 and thereby loosening the wedges 62 from the casing 16, permitting water above pump to pass into the strata supplying the well.

I generally prefer to extend the piping 22 entirely through the first water bearing stratum and into the second, as shown in the screen 19; it being understood that the water from the first stratum will flow down the casing 18 to the second when the water level falls sufficiently therefor.

In general I prefer the form of apparatus as shown in Figure 1, both because the means for fixing the pump in place is more easily adjusted, and because of the superior mounting of the pump shaft inside the sectional casing as therein shown, and making the pump shaft in sections. But in cases where the pump will not be moved for a long time, the device of Figure 11 may be used for wedging it in place.

It will be seen that by fastening the pump within the casing in such position as to leave an unobstructed passage around it, I provide for draining water into the well in cases where this is desired, as often happens when fields are flooded, and when it is desired to drain the fields. The whole apparatus being self-contained, can be put together in proper form and lowered into the well at once. It will be seen also that the toggle levers used for actuating the wedges may be used or not, as desired, since the wedges alone will be amply sufficient in the apparatus of Figure 1, as well as in that of Figure 10. I consider it of great advantage also to

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arrange the pump shaft in a closed casing with stuffing box at surface of ground at top of pump, so that by the use of the packing boxes an air-tight chamber can be maintained, and water kept out of the casing 20, or kept filled with clean liquid, if desired, thereby providing an efficient lubricating system for all bearings of the pump.

The many advantages of this apparatus will be apparent to those familiar with the use of such devices from inspection of the drawings.

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Having thus described my invention and illustrated its use, what I claim and desire to secure by letters patent, is the following:

1. In well apparatus the combination with a pump and means for suspending it from the top of the well, of wedging devices for fixing the pump at any desired point within the well casing.

2. In well apparatus the combination with a pump and means for suspending it from the top of the well, of centering and wedging devices for fixing the pump at any desired point within the well casing.

3. A pump provided with a closed driving shaft casing extending to the top of the well from the pump, a pipe extending downward from the pump casing and means for fixing the pump at any desired point in the well casing, substantially as described.

4. A pump provided with a closed driving shaft casing extending to the top of the well from the pump, a pipe extending downward from the pump casing and means for fixing the pump at any desired point in the center of the well casing, substantially as described.

5. The combination with a pump of an extensible pump shaft therefor and means for supporting the pump at any desired point in the well, and independent support for the shaft.

6. The combination with a rotary pump of an extensible pump shaft therefor and means for supporting the pump at any desired point in the well.

7. The combination with a pump of a sectional pump shaft casing surrounding said pump shaft and extending to the top of the well from the pump, a pipe extending downward from the pump casing and means for fixing the pump at any desired point in the center of the well casing, substantially as described.

top of the well and means for fixing the pump in position at any desired point of the well casing.

21.34 6. In well mechanism in combination with a pump, a series of wedges with means for attaching them to the pump, a series of wedges operated from the top of the well by means of links, a series of wedges carried by the pump casing and operated by toggle links attached to a rod extended to the top of the well, for the purposes specified.

6.1.14 9. The combination with a pump casing of two series of wedges with means for moving them with relation to each other to wedge the said pump casing against the sides of the well casing, substantially as described. ✓

4.12. In combination with a well casing and a pump, a series of wedges suspended by rods from the top of the well for operating the same to wedge the pump casing against the well casing, substantially as described.

6.11. In well mechanism a pump casing provided with a series of wedges mounted upon toggle links therein to wedge the said casing against the side walls of the well casing, substantially as described.

2.9.04 9.12. In well mechanism the combination with a rotary pump of a jointed pump shaft and a closed casing surrounding the pump shaft from the pump to the top of the well. *a pump casing of*

2.1.04 11.12. In well mechanism in combination with a pump shaft supported at intervals by blocks pinned thereto and having tapered joints in said blocks whereby the different sections of the pump shaft may have a vertical play with relation to each other. *and in closed shaft*

11.11. A pump casing provided with a stuffing *a closed shaft casing protecting the bearing* stuffing box plug, means for raising and lowering said

and means for moving all of said screws at once and means for operating the screws from the top of the well, substantially as described.

12 13. In pump mechanism the combination with wedges for fixing the pump in the well casing, of a casing for the pump shaft, a collar thereon and links extending from said collar to the top of the well and to the said wedges.

13 14. The combination with a pump and its actuating shaft of a sectional casing therefor provided at each end of each section with a fixed block with bearings for the shaft, the casing being closed at the top and provided with an air vent.

14 15. The combination with a pump of a pump shaft casing closed at the top and bottom and provided with an interiorly disposed hollow rod for the escape of liquid from the ^{shaft casing and} pump and an air inlet at the top of the casing.

15 16. In well mechanism the combination with a rotary pump of a pump shaft made in sections ^{independently supported and} joined by blocks and keys ^{and a casing} in the blocks and ends of the shaft sections.

16 17. A pump shaft made in sections, each section being suspended on a bearing by means of a block pinned to the shaft section and the next section being splined into said block to rotate therewith.

17 18. The combination with a rotary pump, of a pump shaft and shaft casing surrounding the shaft, the shaft and casing being in sections and connected by bearings at each end, and the shaft section being separately supported in each section of the casing, as described.

18 19. In well apparatus the combination with a pump and means for suspending it from the top of the well, of means

...at any point within the well casing...

In well apparatus the combination with a pump and means for... from the top of the well, of devices for... it at any desired point in the well casing, and means for operating the fixing devices from the top of the well.

Independently supported
1/24. A pump shaft made in sections and suspended in a pipe and provided with bearings and means for lubricating the same.

1/24. In well apparatus the combination of a pump, a casing, therefor, and means for fixing the pump in predetermined position, *and means* whereby water is prevented from passing between the casing and the pump into the well.

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976 *Western Well Works, Inc., et al.*

In Testimony Whereof, I have hereunto set my hand this 3rd day of April, A. D. 1903, at Chicago, Illinois.

MAHLON E. LAYNE.

Witnesses:

PAUL CARPENTER.

ALBERT C. HOWARD.

154704

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2-26.

437

Room No. 120.

Paper No. 1.

All communications should be addressed to

All communications respecting this application should give the serial number, date of filing, and title of invention.

"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE,

Washington, D. C. June 1, 1903.

Patent Office

June—1903

Mailed

Mahlon E. Layne,
Care, Paul Synnestvedt,
518 Frick Bld'g.,
Pittsburg, Pa.

Please find below a communication from the EXAMINER in charge of your application, for Well Mechanism, filed April 28, 1903, Ser. No. 154,704.

F. I. ALLEN,
Commissioner of Patents.

This application has been examined.

Claims 1, 2, 9, 21, and 22 are rejected on Cavallaro, #524,666, Aug. 14, 1894, Artesian and Oil Wells, Tubing and Packing.

Claims 3, 4, and 7 are rejected on Cavallaro above cited and Crannell, #425,933, April 15, 1890, Pumps, Rotary, Single Piston.

Claims 5 and 6 are rejected on Cavallaro above cited, and Northam, #633,474, Sept. 19, 1899, Pumps, Rotary, Single Piston.

Claim 8 is inaccurate, since it states three sets of wedges and only two sets are shown. Properly corrected this claim will be allowed.

Claims 12, 13, and 18 are rejected on the ground that it would not require invention to form the extensible shaft shown in the patent to Northam with joints such as are shown in the patent to Barker, #264,997, Sept. 26, 1882, Journal Boxes, Pulleys and Shafting, Shafting.

Claim 14 is rejected on Redmond, #59,319, Oct. 30, 1866, Artesian and Oil Wells, Tubing and Packing, and Rhodes, #644,638, March 6, 1900, Artesian and Oil Wells, Drilling and Boring.

Claim 17 does not define the construction. Moreover, so far as seen the hollow rod and the air inlet at the top of the casing are one and the same thing. The claim is rejected.

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Layne.—2.

Claims 19 and 20 are allowable as at present advised.

Claim 23 is rejected on Northam above cited and Cook, #603,260, May 3, 1898, Journal Boxes, Pulleys and Shafting, Journal Boxes, Lubricating.

Claim 24 can be read only on the construction shown in Figs. 10 to 13 inclusive and should not be presented in the same application as the remaining claims.

Claims 10, 11, 15, and 16 are allowed.

F. M. TRYON, Ex.

350

WHITEHEAD,

Asst. Ex.

154704

18

Mail Room

Paper No. 2

Feb. 1, 1904

U. S. Patent Office

Law Offices of

PAUL SYNNESTVEDT

Patents, Trade Marks, Corporations

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Chicago, Ill.

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Cable Address—PAULSYN.

PAUL SYNNESTVEDT,

Counselor at Law and Expert in Mechanics.

PAUL CARPENTER,

Patent Attorney.

FRANCIS W. H. CLAY,

Attorney and Counselor at Law.

United States Patent Office,
February 1, 1904. Division IX.

In re Application of Mahlon E. Layne
For WELL APPARATUS

Filed April 28, 1903.

Serial No. 154704

(Room 120).

Cls. 20-22

Pittsburgh, Pa., January 30, 1904.

The Hon. Commissioner of Patents,
Washington, D. C.

Sir:

In response to the Examiner's letter of June 1, 1903, in the above case, the applicant amends as follows:

Claim 4, line 4, after "casing" insert; / and sealing it off from the water in the well. /

Claim 5 line 2, erase "and." At the end of the claim insert a / comma / and the words: / and independent supports for the shaft. /

Claim 6 line 2, at the end of the line after the word "pump" insert; / and shaft.

Claim 7 line 1, before "pump" insert / rotary. /

Claim 8 line 1, after "pump" erase the words; "a series of wedges with means for attaching them to the pump."

Claim 13 line 1, after "pump" insert; / and a closed shaft casing.

Claim 14 line 2, before "screws" insert; / a closed the shaft casing protecting the bearings from/water. /

Claim 17 last line, erase the words "same and" and insert; / shaft casing and /

Claim 18 line 2, after "sections" insert; / independently supported and /. At the end of the claim insert a / comma / and the words; / and a closed casing around the shaft. /

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Claim 22 line 2, before the final word "devices" insert; / a casing separating the pump and bearings from the well, and. /

Claim 23 line 1, before "sections" insert; / independently supported. Line 2, before "pipe" insert closed.

Claim 24 line 2, erase the word "and". Line 3, insert a / comma after "position" and the words / and means. /

Erase claims; 1, 2, 9, and 21, and insert the following claims 21, 22 and 23: after re-numbering the remaining claims:

20 ~~24~~. The combination of a well casing, a rotary pump therein, and a line shaft for the pump entirely closed off from the water in the well.

21 ~~22~~. The combination of a well casing, a rotary pump therein, means for

A

desired

fixing it at any A ~~desire~~ point in the well, an extensible line shaft for the pump and a shaft casing entirely enclosing the shaft and bearings.

22 ~~23~~. The combination of a well casing, a rotary pump therein, means for fixing it at any desired

point, a shaft casing, and a discharge
12, 23, 04 outlet from the pump independent of
insert communicating with the pump casing only
12, 31, 04 at the bottom of the well.
C the shaft casing and A sealed off from
the well casing below the pump.

The references have been carefully examined. The Examiner's attention is first called to the fact that in applicant's device the line shaft and all its bearings are completely closed off from the water in the well, and that the line shaft is supported at various points in the various sections, and that either in the device of Figure 5 or in the device of Figure 10, the outlet for the water from the pump is independent of the casing which surrounds the line shaft, and in case the pump casing is sealed off completely as in Figure 10 the discharge may be through

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the upper end of the well casing and still the water does not come in contact with any of the bearings or the line shaft.

The patent to Cavallaro of course does not show a pump casing separate from the pump of a casing which fits around the pump shaft and seals it off from the inflowing water, as this is merely a device for a constantly flowing well and amounts nothing more than a valve for stopping the upward flow therein. The patent to Crannell not only shows a pump which cannot be fixed at any desired point in the well and which does not operate directly upon the water to raise it through an independent shaft, but the lower bearings in the pump are directly ex-

posed to all the sand and detritus in the water, and the pump is virtually an air pump, being entirely inoperative without the use of the air pump at the top of the well forcing the air in through the pipe 30. There are of course shown no bearings for the line shaft except the ones at the bottom and the line shaft is not extensible, and it will be observed that this pump cannot be used in a well in which the casing may serve as a conduit for water in any case, and necessitates a large well which works on an entirely different principle from applicant's device. It does not appear how the Northam pump can be held to show an extensible shaft inasmuch as the shaft that belongs to any one of the pumps is not extensible and the only way to extend the shaft at all is to put in a new pump. In other words each one of the pumps and its shaft is independently supported, but there is no extensibility of the shaft to any one of the pumps. Moreover it will be observed that all the bearings are directly exposed to the sand and detritus in the water and this is the particular thing which applicant is attempting to

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avoid. The Barker device is not applicable as a reference to this case because it does not allow of any play in the shaft itself; it merely allows the entire shaft to move as a unit through the bearings, and this is not a feature which is applicable to this applicant's device. Moreover being an entirely foreign art it does not show any applicability to a well screen.

The patent to Redmond merely shows a device for

sealing off a small pipe from a large pipe, it does not show a shaft nor any means for sealing off the shaft therein. It is not supposed that this applicant is the inventor of the broad idea of using a wedge for fixing a device at a particular point in the well casing, but only that he is the originator of the idea of operating the tightening mechanism for the pump by means entirely enclosed in the shaft casing and not exposed to the deleterious effect of the water being pumped through the well. The Redmond device is therefore not a reference to anything now in the claims. For this same reason the patent to Rhodes is not applicable as a reference.

Original claim 23 was not met because it does not show a shaft suspended within a glosed pipe as specified, and it will observed that as amended it entirely distinguishes from the prior art, as before said the Northam patent does not show a pump shaft which is extensible but a series of pump shafts each one of which is integral, and moreover the shaft is not enclosed in a casing independent of the pump, which is the essential feature of this device. In fact none of the references show a closed driving shaft casing which extends from the top of the well

means to fix

from the pump and ~~A being affixed~~ to the pump in the well casing. These two features are necessarily combined because the essential thing of the invention is the drawing up of the water from below the

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pump and discharging it through an outlet which is independent from the casing enclosing the bearings,

whereby the bearings are entirely protected from the flowing water. For this reason such claims as original 3 are respectfully re-submitted for examination. The uncertainty in original claim 8 was inadvertent owing to the repetition of a clause therein which has been erased in lines 1 and 2. It is respectfully submitted that the claims as now written are allowable over these references, and in case of rejection the Examiner is asked to point out element for element the claims anticipated.

MAHLON E. LAYNE.

By His Attorney,

PAUL SYNNESTVEDT.

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~~1600~~

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2—260.

Div. 9. Room 142.

All communications should be addressed to

"The Commissioner of Patents,
Washington, D. C."

Paper No. 3.

All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

Washington, D. C., February 15, 1904.

Patent Office. Feb. 15, 1904. Mailed.

Mahlon E. Layne,

Care, Paul Synnestvedt,

518 Frick Bldg.,

Pittsburg, Pa.

Please find below a communication from the EX-

AMINER in charge of your application, for Well Mechanism, filed April 28, 1903, Ser. No. 154,704.

F. I. ALLEN,
Commissioner of Patents.

This application has been considered as amended Feb. 1, 1904.

The requirement that claim 20 (original 24) be presented in a different application from the remaining claims is repeated, since, as pointed out in the last Office letter, that claim can be read only on the form of the device shown in Fig. 10.

In Claim 21, line 2, "desire" should be desired.

It should be stated before which word "pump" in line 1 of claim 5 the word "rotary" should be inserted, and this claim should be properly punctuated.

Claim 2 is inaccurate, since the pump is not sealed off from the water in the well. When properly corrected this claim will be allowed.

Claim 4 is rejected on the ground that it does not distinguish in terms from an aggregation of features shown in Northam and Cavallaro, both of record.

Claim 9 does not distinguish in terms from an aggregation of Northam and Crannell, both of record, and is rejected.

Claims 23 is not understood. So far as seen the discharge outlet from the pump is not sealed off from the well casing below the pump. If it is intended that this claim shall read only on the form shown in Fig. 10 then it should not be presented in this application.

986 *Western Well Works, Inc., et al.*

The remaining claims are allowed.

F. M. TRYON,
Ex.

R. F. WHITEHEAD,
Asst. Ex.

154704

24

Paper No. 4.

Mail Room. Dec. 9, 1904. U. S. Patent Office.
U. S. Patent Office. Dec. 10, 1904. Division IX.

Law Offices of

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Counselor at Law and Expert in Mechanics.

PAUL CARPENTER,

Patent Attorney.

FRANCIS W. H. CLAY,

Attorney and Counselor at Law.

In re Application of M. E. Layne for Well Apparatus. Filed April 28, 1903. Serial No. 154,704. (Room 142.)

Pittsburgh, Pa., December 8, 1904.

Cl. 4.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

In response to the Examiner's letter of February

14, 1904, in the above case, the applicant amends as follows:

Erase the insert at the end of line 4, claim 2, and substitute / "and sealing said shaft off from—? / water in the well," / (that is, change the word "It" in the former amendment to / said shaft). /

Re-write claim 4 as below:

4. The combination of a rotary pump, and extensible pump shaft and protecting casing for the shaft, and means for supporting the pump and shaft and casing at any desired point within the well.

In claim 5, line 1, the word "rotary" should be inserted before the first occurrence of the word "pump." Make a comma after this word "pump," and in line 2 change "said" to / the. /

Claim 9, line 1, after "with" insert / a pump casing, of. /

Erase claim 20.

Claim 22, line 2, spell the word "desired."

As to claim 23, it is submitted the Examiner misapprehends. The discharge outlet is sealed off from the well casing below the pump in all instances,—that is, the water cannot enter the pipe 22 from the well casing anywhere except at the bottom, so that

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the water from all strata, though it may enter the casing 18 or the casing 17, cannot get into the outgoing stream without passing to the bottom of the

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whole well. It is believed the language makes this clear when the claim is read as a whole, and does not require change. Any suggestion as to clearer wording which the Examiner may suggest will be accepted, if it is necessary.

Respectfully submitted,

MAHLON E. LAYNE.

By his Attorney,

PAUL SYNNESTVEDT,

C.

154704

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2—260.

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Div. 9. Room 142.

All communications should be addressed to

"The Commissioner of Patents,
Washington, D. C."

Paper No. 5. J. L. D.

All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE,

Washington, D. C., December 20, 1904.

Patent Office. Dec. 20, 1904. Mailed.

Mahlon E. Layne,

Care, Paul Synnestvedt,

Pittsburg, Pa.

Please find below a communication from the EXAMINER in charge of your application, for Well Mechanism, filed April 28, 1903, Ser. No. 154,704.

F. I. ALLEN,

Commissioner of Patents.

This application has been considered as amended
Dec. 9, 1904.

Claim 22 (original 23) is not clear. The expression "sealed off from the well casing below the pump" is not seen to be accurate. It is true that the pump has a closed casing with a suction pipe extending below the same so that any water that would leak into the well could reach the pump only through the suction pipe, but this would be true of any pump of this type which might be placed in a well, for example that shown in Andrews, #4418, March 14, 1840, Pumps, Rotary, Single Piston.

The remaining claims are allowed.

F. M. TRYON,
Ex.

WHITEHEAD,
Asst. Ex.

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154704

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Mail Room. Dec. 23, 1904. U. S. Patent Office.
U. S. Patent Office. Dec. 24, 1904. Division IX.

Law Offices of

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PAUL CARPENTER,

Patent Attorney.

FRANCIS W. H. CLAY,

Attorney and Counselor at Law.

990 *Western Well Works, Inc., et al.*

In re Application of M. E. Layne for Well Apparatus. Filed April 28, 1903. Serial No. 154,704. (Room 120.)

Pittsburgh, Pa., Dec. 22, 1904.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

In response to the Examiner's letter of December 20, 1904, in the above case, applicant amends claim 22 (original 23) by erasing at the end the clause "sealed off from the well casing below the pump" and inserting / communicating with the pump casing only at the bottom of the well.

The claim is distinguished from Andrews by the several other limitations.

Respectfully submitted,

MAHLON E. LAYNE.

By his Attorney,
PAUL SYNNESTVEDT,

C.

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154704

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LAW OFFICES OF
PAUL SYNNESTVEDT
PATENTS TRADE MARKS CORPORATIONS
315 FRANKLIN AVENUE
CHICAGO, ILL.

In re Application of M. E. Layne
for NEW APPARATUS
Filed April 20, 1904
Serial 1-155,700
(2000, 145)

Pittsburgh, Pa. December 30, 1904.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:-

In the matter of the above application, please enter
the following amendment:

Add claim 23, as follows:

23.- A driving device for transmitting
power comprising in combination a shaft, a closed
tube surrounding said shaft and boxes in said tube
forming bearings for the shaft, substantially as
described.

Applicant has found that the driving shaft ar-
rangement, herein described, with the means for lubricat-
ing the same and protecting it from sand and water is
applicable in many cases to underground work, and the a-
bove claim is therefore inserted in order to protect said
feature more broadly.

Respectfully submitted,

Mahlon E. Layne

By his attorney, *Paul Synnestvedt*

Div. 9. Room 142.

All communications should be addressed to

"The Commissioner of Patents,
Washington, D. C."

Paper No. 8. J. L. D.

All communications respecting this application should give the serial number, date of filing, and title of invention.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

Washington, D. C., January 13, 1905.

Patent Office. Jan. 13, 1905. Mailed.

Mahlon E. Layne,

Care, Paul Synnestvedt,
Pittsburg, Pa.

Please find below a communication from the EX-AMINER in charge of your application, for Well Mechanism, filed April 28, 1903, Ser. No. 154,704.

This application has been considered as amended Dec. 23, and Dec. 31, 1904.

F. I. ALLEN,

Commissioner of Patents.

Claim 22 is allowed.

Claim 23 is rejected in conformity with the Commissioner's decision in *ex parte* Selle, 110 O. G., 1728, since this claim covers merely a lubricating shaft bearing and hence division will have to be required between this claim and the remaining claims in the case, applicant having already elected the invention before claimed.

F. M. TRYON,

Ex.

WHITEHEAD,

Asst. Ex.

vs. Layne & Bowler Corporation. 993

Mail Room. Oct. 24, 1905. U. S. Patent Office.
Division 9, Paper No. 9. Oct. 25, 1905.
U. S. Patent Office,
Law Offices of

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PAUL CARPENTER,

Patent Attorney.

FRANCIS W. H. CLAY,

Attorney and Counselor at Law.

In re Application of M. E. Layne for Well Appa-
ratus. Filed April 28, 1903. Serial No.
154,704. (Room 142.)

Pittsburgh, Pa., October 23, 1905.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

In response to the office letter of January 13,
1905, the applicant amends by erasing claim 23.

Claim 23 is the only claim under rejection, so that
this action puts the case in condition for allowances,
and an immediate allowance is requested.

Respectfully,

MAHLON E. LAYNE,

By his Attorney,

PAUL SYNNESTVEDT.

154704

2—181.

Serial No. 154,704.

A. S. W.
Issue Division,

All communications should be addressed to

"The Commissioner of Patents,
Washington, D. C."DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

Washington, D. C., Nov. 6, 1905.

M. E. Layne,

c/o Paul Synnestvedt,

518 Frick Bldg.,

Pittsburg, Pa.

Sir: Your APPLICATION for a patent for an IMPROVEMENT IN Well Mechanism filed Apl. 28, 1903, has been examined and ALLOWED.

The final fee, TWENTY DOLLARS, must be paid, and the Letters Patent bear date as of a day not later than SIX MONTHS from the time of this present notice of allowance.

If the final fee is not paid within that period the patent will be withheld, and your only relief will be by a renewal of the application, with additional fees, under the provisions of Section 4897, Revised Statutes. The office aims to deliver patents upon the day of their date, and on which their term begins to run; but to do this properly applicants will be expected to pay their final fees at least TWENTY DAYS prior to the conclusion of the six months allowed them by law. The printing, photolithographing, and engrossing of the several patent parts, preparatory to final signing and seal-

IN REMITTING THE FINAL FEE GIVE THE SERIAL NUMBER AT THE HEAD OF THIS NOTICE.

the credit allowed is subject to the collection of the same. If payment is made by check or draft, the

ing, will consume the intervening time, and such work will not be done until after payment of the necessary fees.


When you send the final fee you will also send, **DISTINCTLY AND PLAINLY WRITTEN**, the name of the **INVENTOR** and **TITLE OF INVENTION** AS ABOVE GIVEN, **DATE OF ALLOWANCE** (which is the date of this circular), **DATE OF FILING**, and, if assigned, the **NAMES OF THE ASSIGNEES**.

If you desire to have the patent issue to **ASSIGNEES**, an assignment containing a **REQUEST** to that effect, together with the **FEE** for recording the same, must be filed in this office on or before the date of payment of final fee.

After issue of the patent uncertified copies of the drawings and specifications may be purchased at the price of **FIVE CENTS EACH**. The money should accompany the order. Postage stamps will not be received.

Respectfully,

F. I. ALLEN,
Commissioner of Patents.

 After allowance, and prior to payment of the final fee, applicants should carefully scrutinize the description to see that their statements and language are correct as mistakes not incurred through the fault of the office, and not affording legal grounds for reissues, will not be corrected after the delivery of the letters patent to the patentee or his agent.

154704

JMH

Serial No. 154,704.

Issue and Gazette Division.
All communications should be addressed to

"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

Washington, D. C., May 4, 1906.

Mahlon E. Layne,
c/o Paul Synnestvedt,
518 Frick Building,
Pittsburg, Pa.

Sir: Your application for a patent for an IMPROVEMENT IN WELL MECHANISM filed April 28, 1903, has been examined and again ALLOWED.

The final fee, TWENTY DOLLARS, in the above-entitled case was received May 4, 1906.

Very respectfully,

F. I. ALLEN,
Commissioner of Patents.

154704

75

2—327

\$20 Received May 4, 1906. Chief Clerk U. S. Patent Office.

MEMORANDUM
of
FEE PAID AT UNITED STATES PATENT
OFFICE.

(Be careful to give correct Serial No.)

Serial No. 154,704 1900.

Inventor: Mahlon E. Layne.

Patent to be Issued to Mahlon E. Layne.

Name of Invention, as Allowed: Well Mechanism.

Date of Payment: May 3, 1906.

Fee: Twenty dollars (check No. 1506).

Date of Filing: April 28, 1903.

Date of Circular of Allowance: November 6, 1905.

The Commissioner of Patents will please apply the accompanying fee as indicated above.

PAUL SYNNESTVEDT,
Attorney.

Send patent to Paul Synnestvedt, Lawyer, Patents, Trade Marks, Copyrights. No. 518 Frick Bldg., Pittsburgh, Pa.

50
100

154704

No. 821,653.

PATENTED MAY 29, 1906.

M. E. LAYNE.
WELL MECHANISM.

APPLICATION FILED APR. 28, 1903.

4 SHEETS—SHEET 1

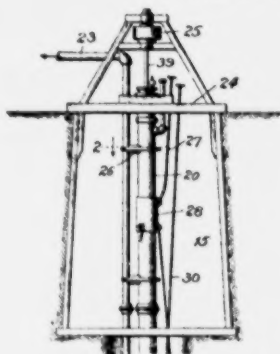


Fig. 1.

Witnesses:
Chas. H. Clark
Oscar Stummagel

Fig. 2.

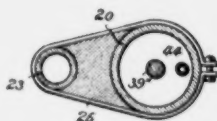


Fig. 3.



Fig. 4.

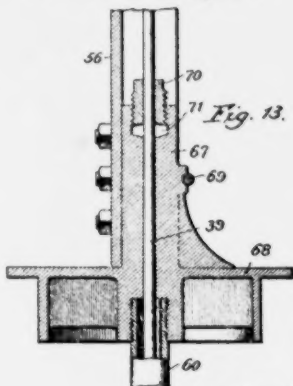


Fig. 13.

Inventor:
Mable E. Layne

By Paul Lynneford
Att'y

No. 821,653.

PATENTED MAY 29, 1906.

M. E. LAYNE.
WELL MECHANISM.
APPLICATION FILED APR. 28, 1903.

4 SHEETS—SHEET 1.

Fig. 5.

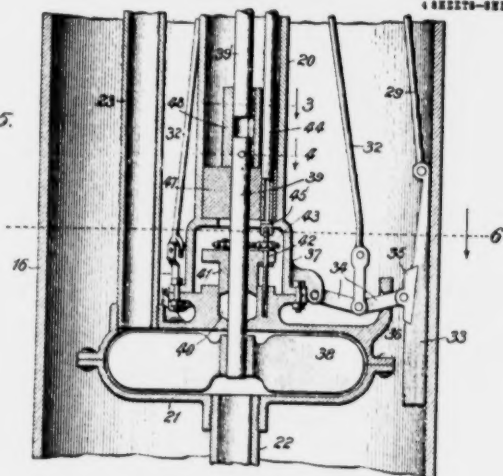
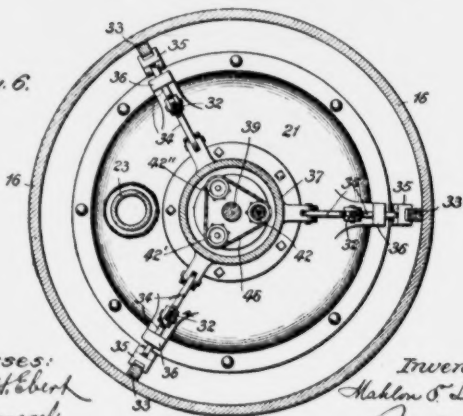


Fig. 6.



Witnesses:
Chas. F. Ebert
Oscar Steuermann

By

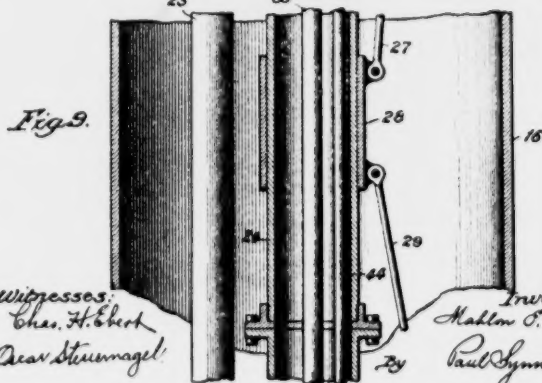
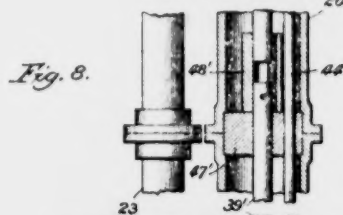
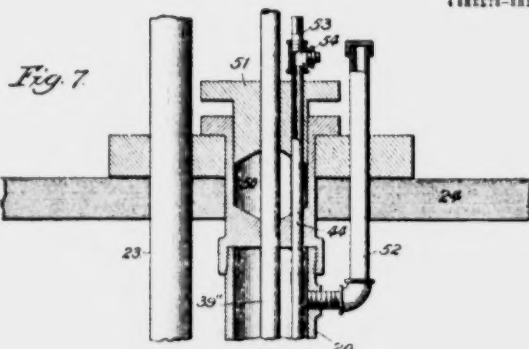
Inventor
Maklon O. Layne
Paul Lynne, Atty.

No. 821,653.

PATENTED MAY 29, 1906.

M. E. LAYNE.
WELL MECHANISM.
APPLICATION FILED APR. 28, 1903.

4 SHEETS—SHEET 2



Witnesses:
Chas. H. Gert
Oscar Steuermann

Inventor:
Maklon O. Layne
Paul Symmetratt
Att'y

No. 821,853.

PATENTED MAY 29, 1906.

M. E. LAYNE.
WELL MECHANISM.

APPLICATION FILED APR. 22, 1903.

4 SHEETS-SHEET 1

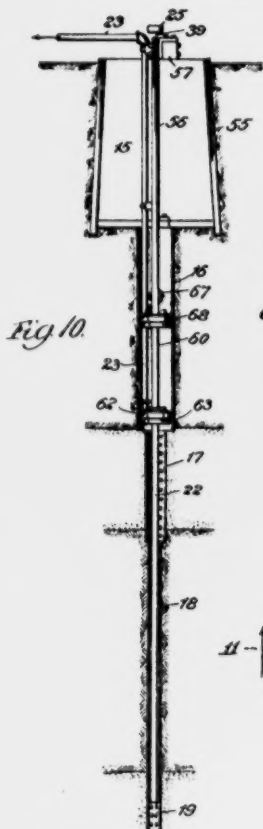


Fig. 10.

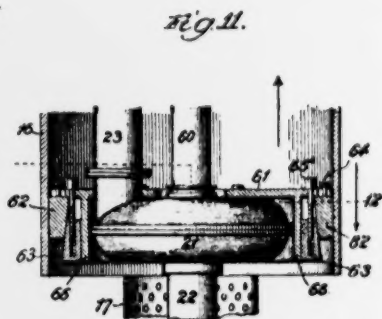


Fig. 11.

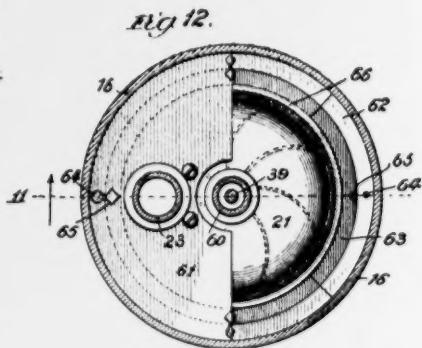


Fig. 12.

Witnesses:
Chas. H. Ebert
Oscar Steunagel.

Inventor:
Mabel T. Layne
By Paul Synnott
Att'y.

UNITED STATES PATENT OFFICE.

MAHLON E. LAYNE, OF HOUSTON, TEXAS.

WELL MECHANISM.

No. 821,653.

Specification of Letters Patent. Patented May 29, 1906.

Application filed April 28, 1903. Serial No. 154,704.

To all whom it may concern:

Be it known that I, MAHLON E. LAYNE, a citizen of the United States, residing at Houston, county of Harris, and State of Texas, have invented certain new and useful Improvements in Well Mechanism, of which the following is a specification.

My invention relates to the apparatus used for drawing water from driven or Artesian wells, and particularly to the means for adjusting a pump therein. The objects of the invention are, to provide means by which the piping and the pump may be all assembled in proper shape before inserting it into the well; to provide means by which a pump may be placed in any desired position in a well, centered, raised or lowered and fixed in position by manipulating from the outside entirely; to provide means for adjusting the length of the piping leading from the pump to the surface at will and to lower the pump from time to time without taking it out of the well; to provide improved means for centering and fixing the pump in proper position in the well casing; to provide improved means for manipulating the packing of the pump shaft, and proper adjustment of the pump in place by means at the surface of the ground; to provide for the proper action of a pump without stopping up the well, so that water may be either flowed into or pumped out of the same at pleasure; to provide a superior mounting for a centrifugal pump in the well, manipulated from the surface of the ground; to provide an extensible pump shaft separately supported at intervals along its length; to provide an automatic centering device for the pump in the well; to provide for mounting the pump and the shaft in a closed casing which is open to operate from the top; to obviate the necessity of making large wells for descending into them in order to arrange the pump, and to generally improve and cheapen the apparatus used for the above purposes.

The above objects, as well as other advantages which will hereinafter appear, I attain by means of the construction and assemblage of parts as illustrated in preferred forms in the accompanying drawings, wherein—

Figure 1 represents a section of a well showing the preferred form of my apparatus in place therein.

Figures 2, 3 and 4 are horizontal sections

of the shaft casing respectively taken on line 2 of Figure 1, and lines 3 and 4 in Figure 2.

Figure 5 is an enlarged central vertical section taken through the pump and the casing of the well.

Figure 6 is a horizontal section of Figure 5 taken along the line 6.

Figure 7 is a section of a top of the well casing containing the pump shaft and its mounting; Figure 8 is a similar section taken at one of the joints of the pump shaft casing.

Figure 9 is a section taken through the casing containing the pump shaft at the collar 28 in Figure 1.

Figure 10 is a vertical section of a well having a modified form of the apparatus therein.

Figure 11 is a side view and partial section of a centrifugal pump mounted by a modified method.

Figure 12 is a half plan and half section of the pump shown in Figure 11, taken along the line 12 therein.

Figure 13 is a partial vertical section taken through the shafting and its mounting shown in Figure 10 at the point marked 68.

For convenience of illustration the apparatus is shown as applied to a well which passes through two water bearing strata separated by an impervious stratum, the top surface of the ground being also an impervious layer of earth. The upper chamber 15 of the well may be protected by wooden framing as customary, or it may be but a continuation of the chamber inclosed by the casing 16, which may be carried to the surface if desired, and the chamber 15 dispensed with. Below this is a screen 17 in the sand layer, and still below the screen 17 is another casing 18, into which extends the suction pipe 22, from the pump 21, and below this another screen 19.

In the approved form as illustrated in Figure 1, I use a centrifugal pump 21, single or in a series, as may be desired, and having a top discharge. It is attached to a casing 20, which runs to the top of the well and incloses the driving shaft 39 of the pump, which may be driven by a pulley 25, mounted in the framework 24, in any approved manner. An outlet pipe 23 leads from the pump to the surface to carry off the water. As shown in Figure 2, the shaft casing 20, and the outlet pipe 23, are bound together by means of the block-and-strap arrangement 26. These connecting devices are distributed at intervals

along the length of the shaft casing. In order to previously assemble all the parts and then put the pump into the well and fix it in position therein, I provide a system of wedges 33, which serve to fix the pump in place and hold it in the proper vertical position, designed to be operated by means from the top of the well, avoiding the necessity of a man's going into the well in order to fix the pump in place. Pivoted to an extension on the head of the centrifugal pump casing 37, I provide a series of toggle links 34, which are carried in slots in the extension 36 of the casing, and at their outer ends bear wedge blocks 35, which embrace and cooperate with the vertically movable wedges 33, placed against the casing 16. The wedges 33 may be attached to links 29, which are carried by a sliding collar 28 on the casing 20, the collar 28 being operated by a rod 27, which runs to the top of the well, so that from the top the wedges 33 may be raised and lowered into place and can be tightened therein. The toggle links may be also connected by links 32, to a collar 31, and the collar 31 to a rod 30, which extends to the top of the well as before, in order to manipulate it without going into the well. Thus in order to obtain greater power and fix the wedges more securely in place, it will be observed that by pulling up on the rod 32, the toggle links 34 will cause the wedge blocks 35 to press with great power against the wedges 33, and thus fix the pump casing in place wherever desired.

The pump shaft 39 is inclosed in a shaft casing 20, which latter is made in joints and may be of any desired length. The pump shaft also is made in sections 39', 39'', 39''', which are attached together by means of sliding keys so as to allow of some vertical play with relation to each other. From Figure 5 it will be seen that the shaft 39 passes through a block 47, and at its top is fixed in the bearing block 48 by means of the pin 50, as shown in Figure 4. The next section of the shaft, 39'', is inserted into the block 48, and prevented from rotating by means of the key 49, which is splined therein. The weight of the shaft and pump below the block 47 is carried by the block 48; and from Figure 8 it will be seen that a similar arrangement is made at the top of the next section of the shaft casing, where the block 47' supports the weight of the section of shaft 39' by means of the collar 48', connected by a pin and key as before.

At the top, the casing 20 is closed and is provided with a stuffing box 50, closed by the cap 51, at the top of the shaft 39''. The shaft 39 is fixedly keyed to the vanes 38 of the centrifugal pump, and below the pump casing 21 is a pipe 22, which extends down below the water level and is extended any desired depth in the well.

The casing 20 also contains a tubular rod 44, which has a bearing in the block 47 on top of the pump casing 37, as shown in Figure 5, and is provided with a square opening which cooperates with the head of the screw 42, 70 used for adjusting the cap 41 of the packing box 40 for the pump, and compressing the packing in place. In order that this cap 41 may be raised and lowered evenly, the screw 42 is provided with a sprocket wheel, and 75 two other screws of a similar kind are distributed about the cap, as shown in Figure 6, and connected by means of the sprocket chain 46, so that by means of the tubular shaft 44, all three of said screws 42 may be 80 turned at once to compress the packing in box 40.

This pipe or tubular shaft 44 also serves the purpose of providing convenient means for forcing the liquid out of the pump shaft 85 casing. By forcing air in at the top of the casing 20, by means of the pipe 52, the liquid can be forced down to the bottom of said casing 20, and by means of the small opening 45, in the bottom of the tubular shaft 44, the fluid can be forced out at the top 54, and keep the casing clear in order to leave the bearings clean therein and not interfere with the working of the pump, or by forcing fluid in at the top 54, the operation will be reversed, and the fluid ejected from pipe 52. 95

It will be noticed that the weight of the pump and its shaft is supported at each end of the sections of the casing by the blocks 47, 47', etc. By reason of this arrangement the pump shaft and the shaft casing can be made in separable sections, and consequently the pump may be inserted at any desired depth and the parts assembled before putting them into the well. The wedge system illustrated for tightening the pump casing in place may also, if desired, be used to center it with respect to the casing. The outlet pipe 23 is also preferably made in sections to correspond with the sections of the pump shaft 110 casing.

In Figures 10 to 13 I have shown a modified form of the apparatus which uses a simple series of wedges for fixing the pump in place, as illustrated best in Figure 11. The pump casing has a platform 61, and a depending ring flange 66, and a series of wedges 63 are placed around the depending flange 66, and are connected to the top platform by means of a series of screws 65. A series of cooperating wedges 62 may also be provided, suspended from the platform 61 by means of the screws 64, and the two series of wedges surround the whole casing. It will sometimes be convenient to dispense with the outlet pipe 23, and extend the casing 16 to the top, to act itself as the conveying channel for the liquid. In each case, of course, the pump casing 21 and platform 61 will be made water-tight within the casing 16, and for this 134

purpose the wedges 62 will be made in overlapping sections, in order to break the joints seen in Figure 12. The pumps will then deliver directly into the upper casing. It will be plain that by turning the screws 65, the bottom wedges are drawn upward against the wedges 62, by which the casing of the pump is fixed in any desired place and tightened in the well casing 16. The screws 65 may be operated by means of a socket wrench placed upon a long rod and reached from the surface of the ground, or may be extended to the surface of the ground, as desired.

In the case illustrated, the top of the pump shaft may be provided with a pulley 25, as before, and a bearing fixed on some part of the framework, as on the cross beam 57. Extending downward from the beam 57 may be provided a timber 56, and part way down a bearing and support provided for the casing of the pump shaft 60, by means of the block 67, which is carried upon a cross frame 68; and a packing box therein, 71, is closed by a screw 70, the whole being attached to the timber 56 as shown in Figure 13. Below this point the shaft 39 may be inclosed in a casing 60, which is screwed in the block 67, as shown in said Figure. For additional security the block 67 may be attached to the timber 56, by means of the strap 69, which surrounds the same. The casing 60 may be in sections and of any desired length.

I prefer, generally, to allow for free flow of water down the well outside of the pump casing and the pump, in order that the water may be drained into the well when desired, rather than pumping the water out; which I attain by dropping the wedges 63 and thereby loosening the wedges 62 from the casing 16, permitting water above pump to pass into the strata supplying the well.

I generally prefer to extend the piping 22 entirely through the first water bearing stratum and into the second, as shown in the screen 19; it being understood that the water from the first stratum will flow down the casing 18 to the second when the water level falls sufficiently therefor.

In general I prefer the form of apparatus as shown in Figure 1, both because the means for fixing the pump in place is more easily adjusted, and because of the superior mounting of the pump shaft inside its sectional casing as therein shown, and making the pump shaft in sections. But in cases where the pump will not be moved for a long time, the device of Figure 11 may be used for wedging it in place.

It will be seen that by fastening the pump within the casing in such position as to leave an unobstructed passage around it, I provide for draining water into the well in cases where this is desired, as often happens when fields are flooded, and when it is desired to

drain the fields. The whole apparatus being self-contained, can be put together in proper form and lowered into the well at once. It will be seen also that the toggle levers used for actuating the wedges may be used or not, as desired, since the wedges alone will be amply sufficient in the apparatus of Figure 1, as well as in that of Figure 10. I consider it of great advantage also to arrange the pump shaft in a closed casing with stuffing box at surface of ground at top of pump, so that by the use of the packing boxes an air-tight chamber can be maintained, and water kept out of the casing 20, or kept filled with clean liquid, if desired, thereby providing an efficient lubricating system for all bearings of the pump.

The many advantages of this apparatus will be apparent to those familiar with the use of such devices, from inspection of the drawings.

Having thus described my invention and illustrated its use, what I claim and desire to secure by Letters Patent, is the following:

1. A pump provided with a closed driving shaft casing extending to the top of the well from the pump, a pipe extending downward from the pump casing and means for fixing the pump at any desired point in the well casing, substantially as described.

2. A pump provided with a closed driving shaft casing extending to the top of the well from the pump, a pipe extending downward from the pump casing and means for fixing the pump at any desired point in the center of the well casing and sealing said shaft off from water in the well, substantially as described.

3. The combination with a pump of an extensible pump shaft therefor means for supporting the pump at any desired point in the well, and independent supports for the shaft.

4. The combination of a rotary pump, and extensible pump shaft and protecting casing for the shaft, and means for supporting the pump and shaft and casing at any desired point within the well.

5. The combination with a rotary pump, of a sectional pump shaft casing surrounding the pump shaft and extending to the top of the well and means for fixing the pump in position at any desired point of the well casing.

6. In well mechanism in combination with a pump, a series of wedges operated from the top of the well by means of links, a series of wedges carried by the pump casing and operated by toggle links attached to a rod extended to the top of the well, for the purposes specified.

7. In combination with a well casing and a pump, a series of wedges suspended by rods from the top of the well for operating the same to wedge the pump casing against the well casing, substantially as described.

8. In well mechanism a pump casing provided with a series of wedges mounted upon toggle links therein to wedge the said casing against the side walls of the well casing, substantially as described.

9. In well mechanism the combination with a pump casing, of a rotary pump of a jointed pump shaft and a closed casing surrounding the pump shaft from the pump to the top of the well.

10. In well mechanism in combination with a pump and a closed shaft casing, a pump shaft supported at intervals by blocks pinned thereto and having splined joints in said blocks whereby the different sections of the pump shaft may have vertical play with relation to each other.

11. A pump casing provided with a stuffing box and stuffing box plug, a closed shaft casing protecting the bearings from the water screws for raising and lowering said plug and means for moving all of said screws at once and means for operating the screws from the top of the well, substantially as described.

12. In pump mechanism the combination with wedges for fixing the pump in the well casing, of a casing for the pump shaft, a collar thereon and links extending from said collar to the top of the well and to the said wedges.

13. The combination with a pump and its actuating shaft of a sectional casing therefor provided at each end of each section with a fixed block with bearings for the shaft, the casing being closed at the top and provided with an air vent.

14. The combination with a pump of a pump shaft casing closed at the top and bottom and provided with an interiorly disposed hollow rod for the escape of liquid from the shaft casing and an air inlet at the top of the casing.

15. In well mechanism the combination with a rotary pump of a pump shaft made in sections independently supported and joined by blocks and keys in the blocks and ends of

the shaft sections, and a closed casing around the shaft.

16. A pump shaft made in sections, each section being suspended on a bearing by means of a block pinned to the shaft section and the next section being splined into said block to rotate therewith.

17. The combination of a rotary pump, of a pump shaft and shaft casing surrounding the shaft, the shaft and casing being in sections and connected by bearings at each end, and the shaft section being separately supported in each section of the casing, as described.

18. In well apparatus the combination with a pump and means for suspending it from the top of the well, of a casing separating the pump and bearings from the well, and devices for fixing it at any desired point in the well casing, and means for operating the fixing devices from the top of the well.

19. A pump shaft made in independently supported sections and suspended in a closed pipe and provided with bearings and means for lubricating the same.

20. The combination of a well casing, a rotary pump therein, and a line shaft for the pump entirely closed off from the water in the well.

21. The combination of a well casing, a rotary pump therein, means for fixing it at any desired point in the well, an extensible line shaft for the pump and a shaft casing entirely inclosing the shaft and bearings.

22. The combination of a well casing, a rotary pump therein, means for fixing it at any desired point, a shaft casing, and a discharge outlet from the pump independent of the shaft casing and communicating with the pump casing only at the bottom of the well.

In testimony whereof I have hereunto set my hand, this 3d day of April, A. D. 1903, at Chicago, Illinois.

MAHLON E. LAYNE.

Witnesses:

PAUL CARPENTER,
ALBERT C. HOWARD.

2—421. DIVISION IX.

1903

CONTENTS:

Print.

Application O. K. papers.

1. Rej. June 1/03.
2. Amendt. A, Feb. 1, 1904.
3. Rej. Feb. 15/04.
4. Amendt. B, Dec. 9, 1904.
5. Rej. Dec. 20/04.
6. Amendt. √ Dec. 23, 1904.
7. Amendt. C, Dec. 31, 1904.
8. Rej. Jan. 13/05.
9. Amendt. √ Oct. 24, 1905.
10.
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23.

TITLE:

Improvement in Well Mechanism.

Class 103—PUMPS.

Rotary Single Piston.

154,704.

vs. Layne & Bowler Corporation. 1007

[Endorsed]: No. 485—Eq. Layne & Bowler Corpn. vs. Western Well Works et al. Defts. Exhibit "D." Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monekton, Clerk.

Defendants' Exhibit "E."

In the District Court of the United States for the
Western District of Louisiana.

No. 925—IN EQUITY.

MAHLON E. LAYNE et al.,

Plaintiff,

vs.

FRED I. GETTY,

Defendant.

OPINION.

This is a suit brought by Mahlon E. Layne, patentee, and Layne & Bowler Company, his licensee, for infringement of patent, with the usual prayer for injunction, and an accounting for damages and loss of profits. A preliminary injunction was refused, and on appeal the ruling was affirmed without prejudice on final hearing (222 Fed. 918).

The object of the patent in controversy is a pumping apparatus for use with a rotary pump in a drilled well, designed primarily for irrigation pur-

poses. The invention claimed is not in the pump itself, but in the apparatus for the protection, lubrication and alignment of the revolving shaft through which the power is transmitted from the surface of the ground to the blades of the pump near the bottom of the well. From this rotary or centrifugal pump, a pipe for discharging the water leads to the ground, and this pipe and the shaft from a point immediately above the pump are inclosed in a metal casing extending from the pump casing to the surface.

In this shaft casing bearings spaced about six feet apart, and at each end, where the shaft passes out of the casing, the specifications of the patent call for an air tight packing box. This packing box, however, has long since been abandoned and a sleeve bearing, or bushing, is used in its place. The shaft is oiled at the end above ground, and the oil passes from bearing to bearing on down to the end of the shaft where it escapes through the last sleeve bearing or bushing, the clearance between the shaft and the bushing being sufficient to permit the passage of the oil. The patent originally provided a method of forcing the oil out of the casing from time to time by air pressure, but this is not found necessary in actual use, since the substitution of the bushing for the packing box. The effect of the constant feeding of oil during the operation of the pump is to cause a pool to collect above each of the bearings and the pressure of this head of oil through the bearings and the bushing at the bottom of the shaft keeps the water from

entering. Thus, the casing is practically a closed one against the entrance of dirt and sand which would cut and wear out the bearings. These bearings further serve the purpose of holding in a straight line the shaft which otherwise would have a tendency to bore out, or whip, when revolving at high speed. These functions of the apparatus, lubrication, protection and alignment, it is claimed, are infringed by similar construction in the Getty pump. The specifications covering the features of the patent alleged to have been infringed are numbers 9 and 20, which read as follows:

“9. In well mechanism the combination with a pump casing, of a rotary pump, of a joined pump shaft and a closed casing surrounding the pump shaft from the pump to the top of the well.

20. The combination of a well casing, a rotary pump therein, and a line shaft for the pump entirely closed off from the water in the well.”

These two specifications, as held by the Court of Appeals in *Van Ness vs. Layne* (213 Fed. 804), are in effect the same, the only difference being that in number 9, a jointed shaft is called for. No infringement, however, is claimed because of defendant's use of a jointed shaft. Consequently, the two specifications may be regarded as one and the same.

The defendant in answer first denies the validity of the patent, and second, denies, if the patent is valid, that the Getty pump is an infringement. It is claimed by defendant that several prior inven-

tions, and particularly the Crannel pump, patented several years before the Layne pump, embraced substantially the same features as Layne's patent, and so anticipated the latter.

In the suit of Layne vs. El Campo Machine Company, from the Southern District of Texas (195 Fed. 83), involving this patent, the Circuit Court of Appeals, Fifth Circuit, modified the decree of the lower court sustaining the validity of claims 9, 13, 20 and others of the patent, by striking out the finding of infringement as to all of the claims except 13. The validity of claims 9 and 20 was not passed on, but these claims were held not to have been infringed.

Subsequently, in the case of Layne vs. Van Ness, this court sustained the validity of claims 9 and 20 and held them infringed by the Van Ness pump. The decree was affirmed by the Court of Appeals (213 Fed. 804). The contention in the Van Ness case, as in the case at bar, was that claims 9 and 20 of the Layne patent were invalid, having been in effect, covered and anticipated by the Crannel pump, previously patented.

The Crannel apparatus, which was not a commercial success, provided for a closed casing around the shaft transmitting power to a rotary pump, but did not provide intermediate bearings along the line of the shaft. This absence of intermediate bearings is practically the only difference in principle between the two mechanisms in so far as claims 9 and 20 are concerned. It is urged by the defendant that the adding of intermediate bearings

to prevent the shaft from whipping does not involve invention; that it is something that would occur to anyone skilled in the art, and that, likewise, the method of oiling by letting the oil run down from bearing to bearing, would occur to anyone, and had always been the method of oiling vertical shafts.

The Court is much impressed with this argument. The insertion of additional bearings to prevent whipping of the shaft where the distance between bearings is too great, is as simple and natural a thing to do as the putting in a fence of extra posts to prevent sagging of a barbed wire, where the posts of the panels are too far apart. Were the question a new one, I should be inclined to hold the patent invalid, but the same issue was raised and directly passed on by this Court and by the Court of Appeals for this circuit, in the Van Ness case sustaining the patent.

It is contended by the defendant herein that the evidence in the Van Ness case was to the effect that the Crannel pump would not work, whereas, by physical demonstration on the trial of this case, the contrary was shown, and the court therefore should not feel bound by the ruling in the Van Ness case. The opinion in the Van Ness case, however, does not appear to have been based on the evidence that the Crannel patent would not work. The Court held:

“1. It seems quite clear that the idea of a protected casing of a pump shaft without restrictive interpretation would contain no

novelty and would not be patentable, and, if this element in the patent is given the unrestricted meaning that its language admits of, it would destroy the claim. The contention of the defendant is that it should be given the unrestricted generic meaning suggested by its broad language, and that of complainant, that the specifications should be looked to to interpret the claim, and that it should be held to mean only a protective casing of the kind and with the functions set out in the specifications. It seems that the complainant's contention is supported by the authorities cited in his supplemental memorandum and that the argument that the patent granted by the Government should be construed so as to prevail rather than be forfeited, since that must have been the intention of the Patent Office, is a sound one, for limiting the breadth of the language of the claim to the disclosure of the specifications of the patent, if necessary to sustain the patent. If so limited, it would seem that the protective casing intended to be covered by the claim was one of the kind described in the specifications and having the three functions attributed to it by the specifications, namely:

- (1) To exclude water and detritus from the shaft and its bearings;
- (2) to provide a means of lubricating the bearings of each section of the shaft from the top of the well without removing the apparatus from it; and
- (3) to align the bearings and the shaft so as to prevent

lateral displacement in the well and keep the shaft in a vertical position.

2. Giving the claim this significance, it fairly appears from the record, as we see it, that there was no protective casing in the prior art of the kind and with the functions of that of the patent in suit. It also seems fairly to appear from the record that such a protective casing as that set out in the specifications contained novelty enough to constitute invention."

Accepting the view of the Court of Appeals as to the validity of the patent, there is left only the question of infringement. The structure of the Getty pump consists of a shaft with casing held in alignment by bearings and connected with a rotary pump resting on the bottom of the well. The shaft is oiled in practically the same manner as the Layne pump shaft, the oil passing on down the line of the shaft from bearing to bearing and past the last sleeve bearing to the outside. The chief difference urged is that the shaft casing in the Getty apparatus, is not entirely closed; that no packing box is used, as provided in the Layne patent; and, therefore, that there is no infringement. While it is true that water might ordinarily pass up between the bushing or sleeve bearing, and the shaft while the pump is not in action, when it is in operation, and the oil is being constantly fed in at the top of the shaft, the weight of the column of oil pressing downward between the shaft and the bushing, would keep the water out, just as in the case of the

Layne pump, except in small quantities. The same contention was thus disposed of in the Van Ness case:

“If the idea is considered patentable, the last question is whether the defendant’s pump infringes; that is, whether his pump contains the element of a closed shaft casing in the sense to be attributed to that element in the claim of the patent in suit, i. e., one of a kind described in the specifications of the patent and having the same three functions. The defendant denies that his pump shaft casing performs any one of the three functions attributed to that of the patent in suit. He denies that it is a closed casing in any true sense. It seems not to be closed so far as concerns the entrance of air. However, the proper interpretation of the words ‘closed casing’ is a closure only against what is necessary to be excluded for the successful operation of the invention, and that, in this case, as we understand it, is water and sand, because when not excluded the first corrodes and the second wears the shaft and its bearings. It seems also true that the closure against water is only partial, since the lower bearing of defendant’s apparatus is not within the inclosing casing, though the intermediate and top bearings are. So it seems doubtful whether the defendant’s pump casing keeps the water from the shaft and bearings when it is not in operation, and the argument is that in the rice country, where it is principally used,

it remains out of service nine months of the year. For these reasons, it is argued that the defendant's casing is not a closed one, even against water and sand. However, the record shows that protection against water and sand is afforded by defendant's casing to all but one of the bearings and to the shaft in the same degree as by that of the patented casing, at least during the period of the pump's operation, and that the protection afforded by defendant's casing is different only in degree from that afforded by the patented casing. The closure in the patented casing is effected by stuffing boxes as well as by the presence and downward pressure of the oil between the bearings and the shaft, which serves to keep the water from pressing upward into the shaft casing between the bearings and the shaft. The closure in defendant's casing is effected by the last method only, and without the use of packing or stuffing boxes. Each casing serves to affect at least a partial closure against the water and sand. The difference is one of method and degree only, and for that reason it seems that the defendant's casing infringes this element of the patent, at least to some extent."

There is this difference between the Van Ness and the Getty apparatus. In the former the weight of the shaft is largely sustained by a thrust bearing near the bottom of the casing, so that the pressure on the thrust bearing would tend to make

the casing nearer water proof. In the Getty apparatus, which rests on the bottom of the well, there are no thrust bearings, but all the bearings are of the ordinary kind, so that, as argued by counsel, more water would pass into the shaft casing of the Getty pump than into that of the Van Ness pump. Each casing, however, as was said by the Court of Appeals in comparing the Van Ness and the Layne casing, "serves to affect at least a partial closure against the water and sand. The difference is one of method and degree only."

As stated by the Court in the Van Ness case, the questions both as to patentability and infringement are close ones. The evidence on the first question is practically the same in the case at bar as in the Van Ness case, and on the second question, I think there is no substantial difference in the features of the Van Ness and Getty pumping apparatus as to which infringement is claimed.

Following the ruling in the Van Ness case, specifications numbers 9 and 20 must be held to be valid and to be infringed by defendant's pump.

A decree will therefore be entered ordering an injunction as prayed for and an accounting for damages and loss of profits.

GEO. WHITFIELD JACK,
Judge.

[Endorsed]: No. 925. U. S. Dist. Court, West. Dist. of La. M. E. Layne et al. vs. Fred I. Getty. Opinion of Court. Filed Feb. 15, 1919, 11:22 A. M. W. B. Lee, Clerk, U. S. District Court, West. Dist. of Louisiana.

CERTIFICATE OF CLERK OF COURT.

United States District Court, Western District of
Louisiana.

Clerk's Office:

I, W. B. Lee, Clerk of the United States District Court for the Western District of Louisiana, do hereby certify that the foregoing seven pages, numbered from one to seven, inclusive, contain a true, full and correct copy of opinion of court in a cause entitled Mahlon E. Layne et al., versus Fred I. Getty, No. 925 on the docket of said court, as the original of same appears on file in this office.

WITNESS my hand and seal of office, at the City of Shreveport, Louisiana, on this the 12th day of March, A. D. 1919.

[Seal]

W. B. LEE,

Clerk United States District Court for the Western
District of Louisiana.

[Endorsed]: No. 925. United States District Court, Western District of Louisiana. Mahlon E. Layne et al. vs. Fred I. Getty. Opinion of Court. Copy Certified Under Seal. Filed Feb. 15, 1919, 11:22 A. M. W. B. Lee, Clerk United States District Court, for the Western District of Louisiana.

No. 485—Eq. Defts. Exhibit "E." Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monckton, Clerk.

Defendants' Exhibit "F."

[Endorsed]: No. 485—Eq. Layne & Bowler Corpn. vs. Western Well Wks. et al. Defts. Exhibit "F." Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monekton, Clerk.

vs. Layne & Bowler Corporation. 1019

(No Model.)

S. N. EISLER.
ROTARY PUMP.

No. 522,518.

Patented July 3, 1894.

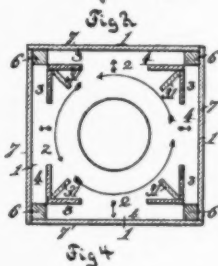
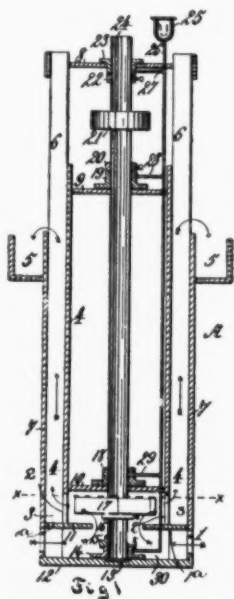


Fig. 5.

Witness
R. E. Rice.
Sidney C. Crook.

Inventor.
Stephen Eisler.
By *Walter H. Cook*
Attorney.

their top edge is a flange 25, by which
may be four, one to receive the water from
from each conduit or passage 2, or one con-
ducting liquid from the central hole 17 and 17a.
flanges (troughs) extending around the casing
19 and 20. This trough or trough
A may be provided. The trough or trough
receive the water from the conduits 2, and
enough 25 is arranged

UNITED STATES PATENT OFFICE.

STEPHEN N. EISLER, OF NEW ORLEANS, LOUISIANA, ASSIGNOR OF
ONE-HALF TO JOHN D. BELTON AND SHAKESPEAR & SWOOP,
OF SAME PLACE.

ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 522,518, dated July 3, 1894.
Application filed June 15, 1893. Serial No. 477,745. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN N. EISLER, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Rotary Pumps; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

My invention relates to certain improvements in rotary pumps, and has for its objects to provide a novel construction and combination of parts whereby the forcing of the water upward to the point of delivery is insured, and to provide novel means for oiling or lubricating the parts of the structure without dismemberment and while in operation.

To these ends my said invention consists in the novel construction and combination or arrangement of parts hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1, is a vertical section of a pump constructed in accordance with my invention. Fig. 2, is a bottom plan view of the lift and force piston. Fig. 3, is a top plan view of the same, and Fig. 4, is a sectional view, taken on the line $x-x$, the piston being shown in dotted lines.

In the said drawings, the letter A, indicates the pump-casing or framing, which is composed of a bottom or base-piece 12, from the four corners of which rise standards or beams 6, secured to which are interior and exterior walls 4 and 7, which are separated from each other to provide water-passage-ways or conduits 3, of which four are shown in the drawings, (see Fig. 4.) The interior walls 4, extend upward beyond the exterior walls 7, as in Fig. 1, to prevent the water passing up the conduit 3 from overflowing into the interior of the casing or framing A.

Secured to the exterior walls 7, at or near their top edges is a trough 5, of which there may be four, one to receive the water flowing from each conduit or passage 3, or one continuous trough extending around the casing A may be provided. This trough or troughs receive the water from the conduits 3, and

may be suitably connected with means of conveyance, (not shown herein and forming no part of the invention,) for carrying the water to any desired point of use.

The numeral 24, designates a shaft vertically arranged within the pump-casing A. At its lower end, this shaft rests upon a steel plate 13, set into the base-piece 12, and revolves or rotates in a bearing 14.

A collar or cap 15 is secured by a set-screw to the shaft 24, and lies upon the top edge of the bearing 14, preventing the access of sand or other foreign matter to the bearing of the shaft. The shaft is supported and steadied laterally by floors or partitions 8, 9 and 10, arranged at suitable intervals vertically, and provided with openings through which the shaft 24 passes, and bearings 19 and 23, arranged in connection with the floors or partitions 8 and 9. In order to retain the shaft in proper vertical position for operation and prevent any vertical movement which might otherwise be induced by the work performed, I firmly secure collars 20 and 22, to the shaft by set screws said collars being arranged in contact with the bearings 19 and 23, as shown in the drawings, one of said collars being arranged above the bearing 19, and the other below the bearing 23; in this manner it will be seen that the shaft is prevented from any vertical displacement or movement.

In prior pumping-apparatus it has been difficult and inconvenient to lubricate the bearings of the propelling shaft, since it was essential that parts of the structure be removed for that purpose. By my invention, I avoid the inconvenience and provide a novel lubricating means by which the shaft-bearings can be lubricated automatically so long as the supply of oil lasts, and whereby oil can be supplied without dismemberment of the apparatus, said means consisting of a vertical pipe 26, arranged interiorly of the pump-casing as shown and communicating at its upper end with the outlet of an oil supply-cup 25.

Branch pipes 27 extend from the vertical pipe 26 and lead to the shaft-bearings 14, 18 and 22, so that the oil or lubricant is automatically fed to said bearings. The oil supply-cup 25 is arranged so that oil can be

placed therein without taking apart the casing or any of the supports of the shaft.

A water-inlet opening 1, is provided at the bottom of the casing A, which extends on all sides of said casing, and extending inwardly in said casing immediately over said opening is an intercepting-plate 1a, above which an opening 2, is provided in the inner wall 4, of the casing, leading to the passage or conduit 3.

The numeral 17, designates a combined lift and force piston which is secured to the shaft 24, so as to rotate therewith, by means of a set screw, or in any other suitable manner said piston being located in the compartment formed by the partition 10 and the intercepting plates 1a, the form thereof being illustrated in Figs. 2 and 3, wherein it is shown as a solid piece of material, the periphery or edge being shaped or formed into a series of inclined pushing surfaces 17a. The shaft 24 is rotated by means of a belt (not shown), running upon the pulley 21, and driven from any suitable source of power. When the shaft 24 is rotated, the piston 17 is also rotated in the direction shown by the arrows, Fig. 4, and by its action draws water in through the opening 1, lifts it up around the intercepting plates 1a and by means of the inclined pushing faces 17a forces it radially outward into the passage or conduit 3 through the opening 2, the water being guided into or compelled to enter the passage 3, by cut-offs 31, located at the four corners of the casing in the same horizontal plane with the openings 2. In the absence of these cut-offs the water would probably travel around with the wheel in a horizontal direction, but by their employment said water is compelled to

enter the passage or conduit 3, and the continued operation of the pan forcing water into said conduit causes the water to rise until it overflows into the trough 5, from whence it may be conveyed, if desired, to any other point for use.

The piston 17, is arranged in a compartment whose roof is formed by the partition 10, which prevents the passage of water up into the interior of the casing A, compelling the water to pass through the opening 2, into the passage or conduit 3.

Having thus described my invention, what I claim is—

In a rotary pump, the combination of a casing A, having inner walls 4 and outer walls 5 7, forming a water conduit 3, the walls 4 extending above the walls 7, the trough 5 arranged beneath the top of the walls 7, a rotatable shaft 24 supported vertically in said casing, a piston 17 carried by said rotatable shaft and having its lower edge formed into a series of inclined pushing or deflecting surfaces 17a, a partition 10 located in said casing immediately above said piston, an intercepting plate 11 arranged beneath the piston and provided with inlet ports 2, a water inlet 1 formed in the outer wall 7 inlets 3 formed in the walls 4 opposite the periphery of the piston, and radially disposed cut-offs 31 arranged between the inlets 2, substantially as shown and described.

In testimony whereof I have hereunto subscribed by name in the presence of two witnesses.

STEPHEN N. EISLER.

Witnesses:

ROBT. E. RIES,
SIDNEY G. COOK.

Defendants' Exhibit "G."

[Endorsed]: No. 485—Eq. Defendants' Exhibit
"G." Filed Sept. 3, 1920. W. B. Maling, Clerk.
By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Ap-
peals for the Ninth Circuit. Filed Jan. 6, 1921. F.
D. Monckton, Clerk.

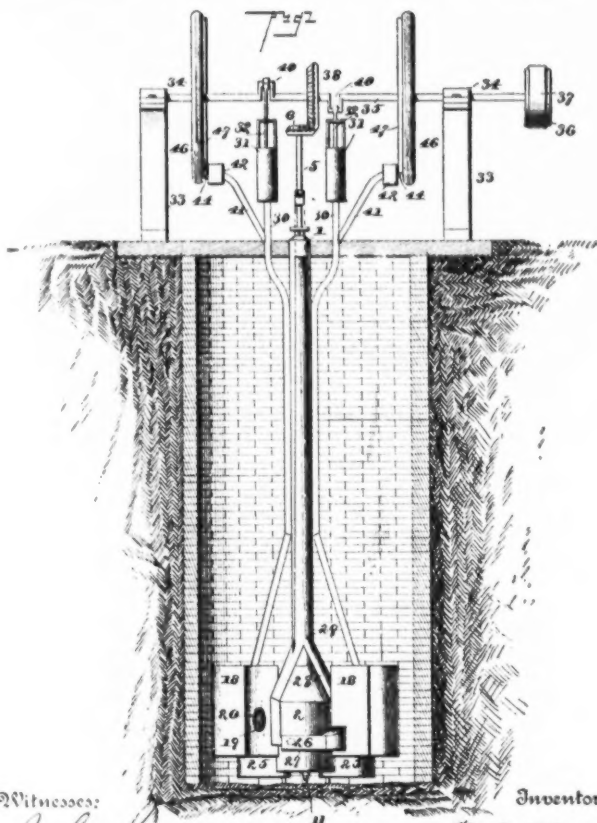
(No Model.)

2 Sheets—Sheet 1.

C. W. CRANNELL.
COMPOUND PUMP.

No. 425,933.

Patented Apr. 15, 1890.



Witnesses:

Inventor

John Minie
W. S. Dewar

Charles W. Crannell

By his Attorneys

Cash & Co.

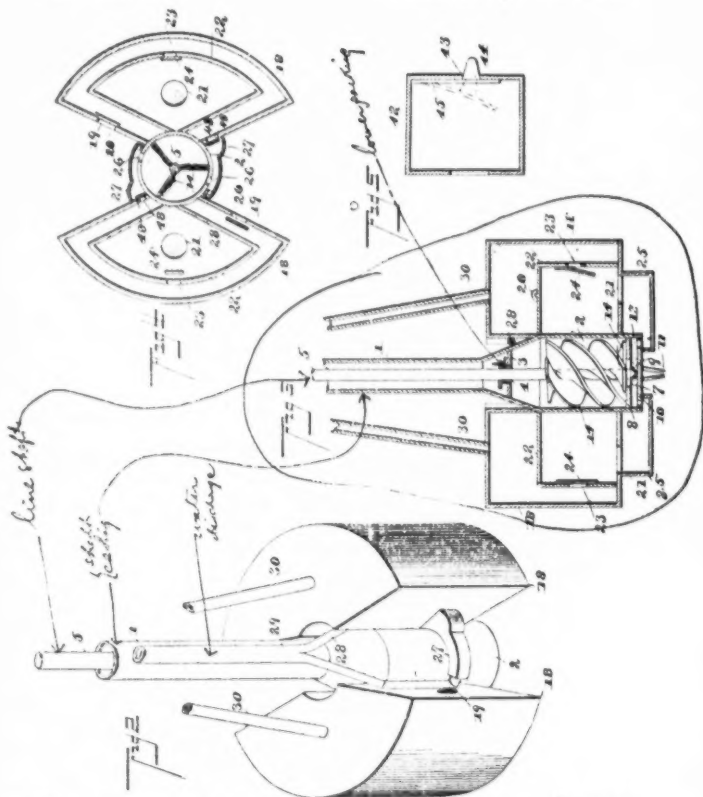
(No Model.)

2 Sheets—Sheet 2.

C. W. CRANNELL.
COMPOUND PUMP.

No. 425,933.

Patented Apr. 15, 1890.



Witnesses:

John Smith
W. S. Swall

Inventor

Charles W. Crannell

By his Attorneys

C. W. Crannell

UNITED STATES PATENT OFFICE.

CHARLES W. CRANNELL, OF OBERLIN, KANSAS, ASSIGNOR OF ONE-HALF
TO FLOYD W. CASTERLINE, OF SAME PLACE.

COMPOUND PUMP.

SPECIFICATION forming part of Letters Patent No. 425,933, dated April 15, 1890.

Application filed December 12, 1889. Serial No. 333,466. (No model.)

all whom it may concern:

Be it known that I, CHARLES W. CRANNELL, a citizen of the United States, residing at Oberlin, in the county of Decatur and State of Kansas, have invented a new and useful Compound Pump, of which the following is a specification.

This invention has relation to compound pumps; and the objects and advantages of the same, together with the novel features thereof, will hereinafter appear, and be particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a vertical section of a well provided with a pump constructed in accordance with my invention. Fig. 2 is a perspective view of the pump; Fig. 3, a vertical longitudinal section; Fig. 4, a transverse section through the pump-cylinder; Fig. 5, a detail in perspective of one of the air-escapes.

Like numerals of reference indicate like parts in all the figures of the drawings.

The hereinafter-described pump is designed to be operated by any suitable motor, and is especially adapted for use in dry countries for irrigating purposes, wherein it is desirable to throw continuous, steady, and large streams over the surrounding territory.

Further objects of the invention are to accomplish the above result with a pump so constructed as to be capable of production at a reasonable cost, which shall consist of few easily manufactured and assembled parts and which shall be very powerful in its operation and capable of operation with a minimum amount of motive power.

Numerous other objects will appear, and I do not herein wish to limit my invention to the exact arrangement and construction of the details shown, as various changes wholly within the scope and spirit of my invention may be readily practiced by those familiar with this class of invention.

1 represents the pump-stock, which is of any ordinary construction and at its lower end merges into a cylinder 2 of considerably greater diameter than the stock, and from which is divided by a diaphragm 3, having a central perforation 4, through which is inserted the pump-rod 5, which passes up

through the stock. At this point it is properly packed and is provided at its upper end with a small pinion 6. The lower end of the rod passes through an opening 7 in the false bottom 8, located at the lower end of the cylinder 2, and the extremity of said rod takes bearing in a step 9, projecting upwardly from the true bottom 10 of the cylinder, which bottom is provided with a series of feet 11 for elevating the pump above the bottom of the well in which the pump is located, as shown in Fig. 1. Between the false and true bottoms of the cylinder there is formed a suction-chamber 13, which chamber, through the opening 7, has direct communication with the cylinder 2, and within the latter cylinder and mounted over the opening 7 and upon the pump-rod, which is rotatable, there is a series of triple-bladed screws 14. The blades of these screws are arranged in a series of three, each radiating from the rod in the form of three spirals arranged equidistant on the rod and extending spirally around the rod from the top to the bottom of the cylinder, so that any water introduced into the suction-chamber will be drawn up into the cylinder 2, when said blades are rotated at a proper speed, and exhaust the air within the cylinder, and water thus drawn up will be caught by the blades and thrown toward the wall of the cylinder, and consequently through any opening that may be formed therein, and which will be hereinafter described.

At diametrically-opposite sides of the cylinder 2 are located induction-chambers 18, which are each provided with an opening 19, covered by inwardly-opening valves 20. Each of the induction-chambers is also provided with an opening 21 in its bottom, which is covered upon its inside by an internal chamber 22, mounted within the induction-chamber, which internal chamber is provided with an opening 23, communicating with the induction-chamber, which is covered by an inwardly-opening valve 24. Passages 25 inclose the openings in the bottoms of the induction chambers and communicate at diametrically-opposite sides with the suction-chamber in the bottom of the cylinder 2.

The wall of the cylinder 2 at diametrically-

opposite points and between the two induction-chambers is provided with eduction-ports 26, and communicating with the same and secured to the cylinder are eduction chambers 27, from each of which there leads an eduction-pipe 28, said pipes meeting above the cylinder 2 and merging into a common discharge-pipe 29, from which the water is discharged in any suitable manner or conducted to any suitable point from the same. From each of the induction-chambers there leads to the top of the well air-pipes 30, the upper ends of which communicate with independent air-pumps 31, designed to be alternately operated.

Any mechanism desired may be employed for rotating the pump-rods and alternately reciprocating the pistons 32 of the pump-cylinders, and I will herein describe a simple means for accomplishing the same.

At each side of the curbing of the well there is located a standard 33, provided upon its upper end with a bearing 34, in which there is journaled a transverse shaft 35, extending across the pump. A pulley 36, driven by a belt 37, leading from any motor, rotates the shaft, and a gear 38, mounted upon the center of the shaft, meshes with and operates the small pinion at the upper end of the pump-rod. Cranked portions 40 are formed in this power-shaft, the cranks being oppositely disposed, and each is connected to the upper end of one of the pistons of the air-pumps, so that when one piston is upon the downstroke the other piston is upon the reverse or upstroke, whereby the induction-chambers of the pump will be alternately filled with air in a compressed state. Each of the air-pipes below its pump is provided with a short section or branch pipe 41, which terminates at its outer end in an air-chamber 42, having an opening 43 at its front normally covered by a gravity swinging valve 45, having a lug 44 projecting outwardly from the front face of the valve through the opening in the chamber. At each side of the pump-cylinders, upon the power-shaft, I mount ordinary fly-wheels 46, which while performing their well-known functions also perform another function, which I will now proceed to describe. Each wheel has its inner face provided with a peripheral cam or flange 47, which flange extends one-half the distance around the wheel, and the flange of one wheel occupies a half of its wheel opposite that half of the other wheel occupied by the other flange, so that when the flange of one wheel is in the upper portion of the circumferential path traveled by the same the lower flange is in the lower half of said path. These wheels are so located with relation to the small air-chambers projecting from the air-pipes that when the flanged halves of the same are in the lower portion or half of their circumferential path the flanges or cams are in contact with the lug or stud upon the gravity-valve, thus pressing the same inward and permitting any air in the induction-chamber with which the

air-pipe communicates to escape. It will be apparent, also, that these flanges are arranged in proper relation with the cranked portions of the shaft operating the piston, so that said valves will be operated at the times that the pistons are on their upstroke.

The operation of my invention may be briefly stated as follows: The machinery being started, one of the induction-chambers will be exhausted and water drawn into the same from the well, which water will by a downstroke of the pump-piston connected with this chamber be forced by compressed air into the internal chamber located within the induction-chamber, and by reason of the air thus forced into the induction-chamber the valves will be forced over the opening, and thus prevent the escape of the water back into the well. From the internal chambers the water is forced by the pump down through the passages and into the suction-chamber at the bottom of the cylinder, and it passes up through the opening 7 in the false bottom 8, where it is scooped by the triple-bladed screw, and by the peculiar formation of the same thrown by centrifugal force through the eduction-ports at the sides of the cylinder and into the eduction-chambers, and from thence to the eduction-pipes, and finally into the discharge-pipe which is common to both eduction-pipes. The operation of the opposite duplicate portion of the pump is exactly the same as just described, only as one set of mechanism is inducing water the opposite set is expelling the same, so that a constant supply of water is passing into the suction-chamber and expelled by the wheel into the eduction chambers and pipes leading therefrom.

Under certain circumstances, as when using the pump in shallow wells, I propose to dispense with the air-compressing mechanism, as in such case its use is not essential to the working of the pump, but still use the air-pipes and leave the opening at the top of the pipes open.

Each of the eduction or discharge chambers 27 communicates with an adjacent induction-chambers through an opening or port 48, normally closed by an inwardly-opening valve 49. By this opening air pumped into the induction-chambers may pass into the eduction or discharge chambers, and thus the water forced through the discharge-pipes.

Certain novel features herein illustrated and described, but not claimed, form a part of the subject-matter of a companion application now pending, filed October 24, 1925, Serial No. 388,018.

Having described my invention, what I claim is—

1. In a compound pump, the combination with the pump-stock terminating at its lower end in a cylinder communicating with a suction-chamber, of a rotatable pump-rod mounted in the stock and having a screw at its lower end, induction-chambers located at each side

of the cylinder and communicating therewith, and having induction-ports and internal chambers mounted in the induction-chambers and communicating therewith and with the suction-chamber, and a pair of pumps, one of which is connected with each of the induction-chambers, and eduction-pipes connecting with the cylinder, substantially as specified.

2. In a compound pump, the combination, with the pump-stock terminating at its lower end in a cylinder communicating with a suction-chamber located at the lower end of the stock, of a rotatable pump-rod mounted in the stock and having a screw at its lower end, induction-chambers located at each side of the cylinder and communicating therewith and having induction-ports and internal chambers mounted in the induction-chambers and communicating therewith and with the suction-chamber, a pair of pumps connected with each of the induction-chambers, and eduction-chambers communicating with ports formed in the cylinder, and a pipe leading from each of said chambers and communicating with a common discharge-pipe, substantially as specified.

3. The combination, with the pump-stock and enlarged cylinder having discharge-ports, induction-chambers communicating with the cylinder through the ports and arranged without and at the side of the cylinder and pipes leading therefrom, and a false bottom having an opening communicating with the cylinder and in connection with the true bottom, forming a suction-chamber, of water-supplying device for delivering water to the suction-chamber, a rotatable pump-rod and a water-screw, and means for operating the same, said screw being so constructed as to take up and deliver the water through the eduction-ports in said chambers, substantially as specified.

4. In a compound pump, the combination, with a pump-cylinder and means for delivering water therefrom, of an induction-chamber provided with an opening and an inwardly-opening valve, and provided with an opening in its bottom, over which is mounted an internal chamber provided with an opening, an inwardly-opening valve, and an air-pump communicating with the induction-chamber, and means of communication between the internal chamber and the pump-cylinder, substantially as specified.

5. In a pump, the combination, with an induction-cylinder, an air-pipe leading therefrom, and a pump connected to the same and adapted to force air thereinto, of an air-chamber located below the pump and communicating with the pipe and having an opening covered by a clap-valve having an outwardly-protruding lug, and of a wheel, a shaft for the same, and means for rotating the wheel, which wheel is provided with a flange or cam for a portion of its circumference adapted for contact with the lug of the

cut-off, and a consequent opening of the latter, substantially as described.

6. In a pump, the combination, with an induction-cylinder, of an air-pump, a pipe connecting the pump with the cylinder, and an air-escape located between the pump and chamber, a valve covering the escape, and a cam-wheel for opening the valve at each upstroke of the piston, substantially as specified.

7. The combination, with the pump-cylinder, the stock, the induction-chambers located at each side of the same and communicating with the stock, and provided with valve-openings and exit-ports leading from the cylinder, of air-pumps located at each side of the pump-stock, air-pipes leading from the pumps to the chambers, pistons mounted in the pumps, a transverse shaft having oppositely disposed cranks connected with the pistons, and means for operating the shaft, substantially as specified.

8. The combination, with the pump-cylinder having discharge-ports, induction-chambers communicating with the ports, and the lower induction-chamber having an opening at its center, of the pump-rod and means for rotating the same, and the triple-bladed screw, as described, and adapted to take up water and throw the same to the eduction-ports, substantially as specified.

9. The combination, with the pump-stock terminating in a cylinder, a screw mounted on a rod within the cylinder, and induction-chambers located at the sides of the cylinder and communicating therewith, a pinion located upon the end of the pump-rod, and opposite air-pumps, each communicating with an induction-chamber and provided with reciprocating pistons, of a shaft extending across the stock and having oppositely-disposed cranks, each connecting with a pump-piston, and a central gear meshing with the pinion, substantially as specified.

10. The combination, with the pump-cylinder, opposite induction-chambers communicating therewith, opposite pumps having pistons, pipes leading from the pumps to the chambers, and air-chambers communicating with the pipe below the pumps and having inwardly-opening valves provided with outwardly-projecting studs, of a transverse shaft oppositely cranked, and each crank connected with a piston, so that the pumps are oppositely operated, and opposite wheels mounted on the shaft, having the opposite halves of their inner faces provided with cams or flanges adapted to come in contact with and operate the valves with the air-chambers, the flange of each wheel occurring opposite the disposition of the adjacent crank-portion of the shaft, so that the air-chambers are opened upon the upstroke of the piston of the pump communicating therewith, and means for rotating said shaft, substantially as specified.

11. The combination, with the pump-cylinder having discharge-ports, of induction-chambers communicating with the cylinder,

pumps connected with the induction-chambers and the latter communicating with the pump-cylinder, a revolving screw mounted in the cylinder, and discharge-chambers mounted over the ports of the cylinder and communicating with the induction-chambers through valve-openings, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CHARLES W. CRANNELL

Witnesses:

F. W. CASTERLINE,
E. G. SIGGERS.

Defendants' Exhibit "H."

[Endorsed]: No. 485—Eq. Defts. Exhibit "H."
Filed September 3, 1920. W. B. Maling, Clerk. By
J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals
for the Ninth Circuit. Filed Jan. 6, 1921. F. D.
Monckton, Clerk.

No. 633,474.

R. J. NORTHAM.
ROTARY PUMP.

Patented Sept. 19, 1899.

Application filed July 29, 1898.

(No Model.)

2 Sheets—Sheet 1.

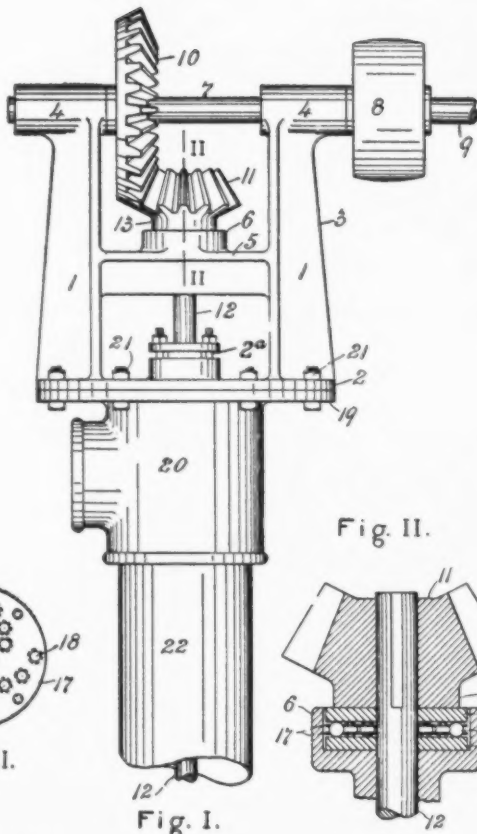


Fig. II.

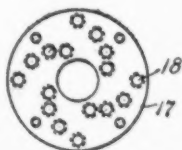
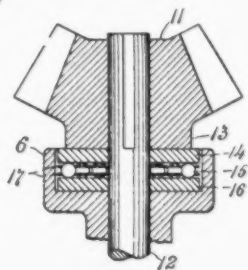


Fig. III.

Fig. I.

Witnesses
Henry E. Brett
Roy Allen

Inventor
R. J. Northam
BY *Knights Rm.*
ATTORNEYS

No. 633,474.

Patented Sept. 19, 1899.

R. J. NORTHAM.
ROTARY PUMP.

(Application filed July 26, 1898.)

(No Model.)

2 Sheets—Sheet 2.

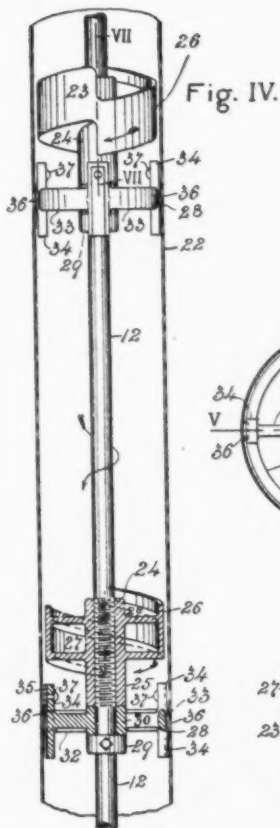


Fig. IV.

Fig. V.

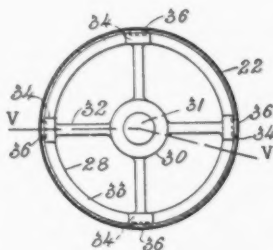
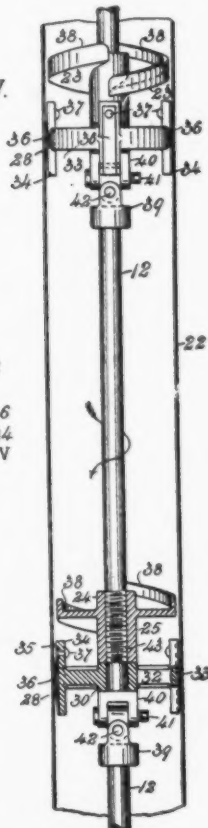


Fig. VI.

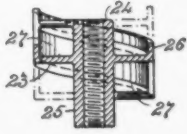


Fig. VII.

Witnesses

George E. Brett
Roy Allen

Inventor

R. J. Northam
BY *King & Ross*
ATTORNEYS

UNITED STATES PATENT OFFICE.

ROBERT J. NORTHAM, OF LOS ANGELES, CALIFORNIA.

ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 633,474, Dated September 19, 1899.

Application filed July 25, 1898. Serial No. 686,867. (No model.)

To all whom it may concern:

Be it known that I, ROBERT J. NORTHAM, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Rotary Pumps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to improvements in rotary pumps, more especially the means of driving the pump-shaft, the screw-blades for raising the water, and the guides for regulating and bracing the pump-shaft, also the peculiar construction of shaft adapted to a well in which the casing may be bent; and my invention consists in features of novelty hereinafter described and claimed.

Figure I is a front elevation of my improved pump-head, showing a fragment of the casing connected therewith. Fig. II is a vertical section taken on line II II, Fig. I. Fig. III is a top view of one of the spacing-plates for the ball-bearings. Fig. IV is a vertical section of a well-casing, showing my improved screw-blades on the pump-shaft and the guides for holding the screw-blades from contact with the inner side of the well-casing, the screw-blades and guides being shown in elevation and also in section. Fig. V is a vertical section of a well-casing, showing a modified form of screw-blades, the spacing-guides, and a modified form of pump-shaft, the screw-blades and guides being shown in side elevation and vertical section, the vertical section of the guide being taken on line V V, Fig. VI. Fig. VI is a plan view of my improved guide. Fig. VII is a vertical section of the screw-blade taken on line VII VII, Fig. IV.

Referring to the drawings, 1 represents my improved pump-head, consisting of a base-plate 2 and vertical posts 3, having journal-bearings 4 located at their upper ends and having a cross-frame 5, with a hub 6.

7 represents an operating-shaft extending in a horizontal direction, to which is secured a driving-pulley 8. The shaft 7 may be extended, as shown at 9, in order that more than one pump may be operated by the same shaft. The shaft 7 is journaled in the bearings 4 and is provided with a beveled gear-wheel 10, the

beveled gear-wheel 11 on the upper end of the pump-shaft 12. On the lower end of the gear-wheel 11 is a collar 13, resting upon a bearing-plate 14, the bearing-plate 14 resting on ball-bearings 15, which in turn rest upon a plate 16. The ball-bearings are spaced apart by means of upper and lower spacing-plates 17, said spacing-plates being provided with a series of circular apertures 18 of less diameter than the ball-bearings and through which the balls partially extend, said balls being thus held a proper distance from each other. The bearing plates 14 16, the ball-bearings, and the spacing-plates are all inclosed by the hub 6 on the cross-frame 5.

2a represents a packing-gland supported by the plate 2, said plate 2 resting upon a plate 19, which is an integral part of a T-coupling 20.

21 represents bolts for securing the plates 2 and 19 to each other.

22 represents a well-casing, to which the T-coupling 20 is secured.

23 represents my improved screw-blades for raising water or other liquid. The blades 23 have a central hub 24, said hub being threaded on its inner side and forming a coupling for the meeting sections of the pump-shaft 12, which screw into said hub. The hub 24 is elongated, as shown at 25, on the under side of the screw-blades, said hub spacing the guides the proper distance from the screw-blades. There may be any number of convolutions of the screw-blade. I have shown two convolutions in my drawings.

26 represents a peripheral shell on the outer ends of the screw-blades, the result being that the passage-way of the water as it passes through the blades is entirely inclosed, thus preventing the water from passing downward over the outer edges of the blades when the pump is in operation.

The provision of the peripheral shell 26 has another advantage in forming a broad surface contiguous to the casing 22 and which prevents the outer edges of the blades 23 from cutting into the casing 22 when the guides become worn or displaced.

27 represents the passage-way through which the water travels as the pump is rotated. In order that the screw-blades may not come in contact with the sides of the well-casing, I

provide a guide 28, loosely mounted upon the shaft 12 and supported by a set collar 29. 30 represents a hub in said guides having a central passage 31, through which the pumping-shaft extends, having radiating spokes or arms 32 and a peripheral ring 33, connecting the ends of the spokes. At the end of each spoke 32 are vertically-extending brackets 34, said brackets being provided on their outer face with vertical slots 35.

36 represents flat springs which are seated in the slots 35 and have their upper ends connected to the brackets 34 by means of rivets 37, said springs pressing outwardly against the inner sides of the well-casing and holding the pump-shaft at the center of the casing. The brackets 34 extend outwardly beyond the outer line of the screw-blades, so that even were the springs entirely compressed within the recesses in the brackets still the periphery of the screw-blades would not come in contact with the sides of the casing.

In Fig. V, I have shown a modification of my screw-blades in which there is only one convolution or two sections forming one convolution, said blades being provided with vertical flanges 38, which retain or prevent the water from passing down between the outer edges of the blades and the well-casing. In

Fig. V, I have also shown a modification of the pump-operating shaft 12, the sections being coupled together by universal joints consisting of knuckles 39, 40, secured to each other by pins 41, 42. The knuckles 40 are connected with a short section of threaded pipe 43, which screws into the hub 25 of the screw-blades, the jointed pump-shaft being adapted for well-casings that have become bent in driving, thus dispensing with the

usual practice of placing a smaller straight casing within a larger crooked casing.

I claim as my invention—

1. A rotary pump comprising a casing, a rotary shaft consisting of sections having screw-threaded ends, the screw-blade having an internally-screw-threaded hub, within which the adjacent screw-threaded ends of the shaft-sections engage, and a peripheral shell contiguous to the casing, the guide having a hub, radial spokes, a peripheral ring and vertical brackets, extending upwardly and downwardly from the ring, and a set collar, whereby the hub of the guide is secured against the hub of the screw-blade; substantially as described. 55

2. As a new article of manufacture, a guide for the shafts of rotary pumps consisting of a central hub through which the shaft passes, radiating spokes, brackets on the ends of said spokes, recesses in said brackets, and flat springs having one of their ends secured in said recesses, substantially as set forth. 60

3. A rotary pump comprising a casing, a rotary shaft consisting of sections having knuckles and screw-threaded ends, the screw-blade having an internally-screw-threaded hub, within which the adjacent screw-threaded ends of the shaft-sections engage, a peripheral shell contiguous to the casing, and a guide having a hub, radial spokes, a peripheral ring and vertical brackets, the hub of the guide being secured against the hub of the screw-blade by one of the knuckles, which acts as a collar; substantially as described. 75

ROBERT J. NORTHAM.

Witnesses:

FRANK S. LIVINGSTON,
JAS. E. KNIGHT.

Defendants' Exhibit "I."

[Endorsed]: No. 485—Eq. Defts. Exhibit "I."
Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A.
Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals
for the Ninth Circuit. Filed Jan. 6, 1921. F. D.
Monckton, Clerk.

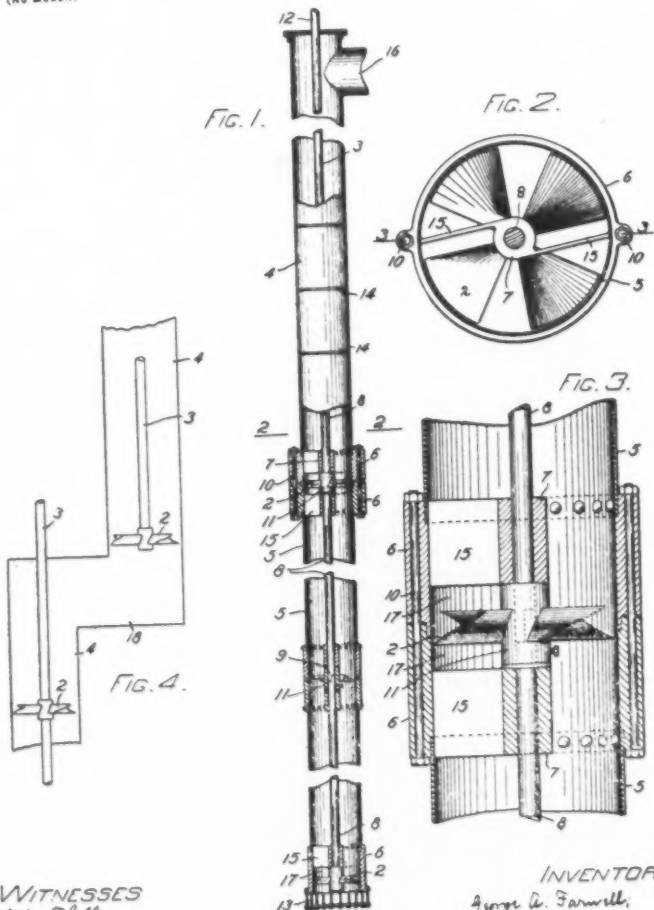
No. 691,123.

Patented Jan. 14, 1902.

G. A. FARWELL.
PUMPING AND DREDGING APPARATUS.

(Application filed Mar. 8, 1901.)

(No Model.)



WITNESSES
Edwin P. Collins
Charles C. Reuter Jr.

INVENTOR
George A. Farwell,
BY
E. A. Blackman,
ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE A. FARWELL, OF MANCHESTER, NEW HAMPSHIRE.

PUMPING AND DREDGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 691,123, dated January 14, 1902.
Application filed March 5, 1901. Serial No. 49,787. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. FARWELL, a citizen of the United States, residing at Manchester, in the county of Hillsboro and State of New Hampshire, have invented certain new and useful improvements in Pumping and Dredging Apparatus, of which the following is a specification.

My invention relates to apparatus such as is used for pumping out dry-docks, wrecks of vessels, and the like, and more particularly to apparatus of that type in which the water is forced upward by the action of one or more propeller-blades secured to a revolving shaft which is centrally journaled within a suitable pipe or passage-way, each propeller being arranged to act upon the water raised up to it and force it upward to the propeller next above it, thus effecting a step-by-step propulsion of the water through the apparatus.

My invention is intended to improve upon prior apparatus of the type above referred to as to certain features hereinafter set forth, and particularly to provide for the building up of an efficient apparatus out of any desired number of similar unit-sections, according to the height to which it is desired to raise the water operated upon, said unit-sections being superimposed and operated simultaneously.

In the accompanying drawings, Figure 1 is a side view, partly in elevation and partly in central vertical section, of a pumping apparatus constructed in accordance with my invention. Fig. 2 is a cross-section, enlarged, on the line 2 2 in Fig. 1. Fig. 3 is a vertical section of a portion of the apparatus, taken on the line 3 3 in Fig. 2. Fig. 4 is a diagrammatic view illustrating a modification of my apparatus.

The apparatus shown in the drawings is composed of a series of screw-propellers 2, secured to and operated by a common shaft or line of shafting 3, which is centrally journaled and supported within a vertical pipe 4. Said pipe and shafting are made up of superimposed similar sections, the number of which varies according to the height to which it is desired to force the water or other material operated upon and which can readily be separated or coupled together, as desired. The apparatus thus comprises a number of similar units, each of which consists, preferably,

of a length of pipe 5, provided at each end with a flange 6, to which it is bolted, and with a central hub or bearing 7, on which is journaled a length of shafting 8, having a propeller 2 secured thereto. In order to enable said unit lengths to be secured together conveniently and expeditiously, I prefer to form the ends of each section of shaft 8 with interlocking half ends, as shown at 9, so that the shaft will rotate as a whole when the units are assembled and fastened together, as by bolts 10, passed through the flanges 6, as shown. Each propeller 2 is secured to its length of shaft 8 at any desired point, but preferably at its upper end, in such manner that the thrust of the propeller is received by the bearing 7, on which it is supported, while the hub 11 of the propeller itself acts as a coupling to receive the interlocking end of the shaft length 8 next above it, as shown in Fig. 3. In the apparatus shown the lower section of shafting 8 has two propellers secured to it, one at each end; but all the sections above it except the top one have only one propeller each, and said top section has none, serving simply to drive the sections below it. Each section of shafting 8 may, however, have any desired number of propellers secured to it, according to its length, the propellers being usually located about eight feet apart. Power is applied to the top of the shaft, as at 12, by any suitable means, but preferably by a direct-connected engine or motor, (not shown,) and the device will ordinarily have a strainer 13 secured to its lower end. In Fig. 1 I have shown the exterior of the pipe 4 as provided with a series of horizontal rods or other projections 14, forming a ladder upon which the apparatus may be ascended and descended.

In order to prevent the column of water contained within the pipe 4 from being rotated bodily by the action of the propellers 2 and thereby diminishing or destroying the propelling effect of the latter, I provide a series of longitudinal ribs or riddle-boards 15, preferably radially arranged and cast integral with the flanges 6 and bearings 7, and thus serving to connect the latter with said flanges. As thus constructed one riddle-board 15 is located above and one below each propeller 2, as shown, so that any tendency of the column of liquid to rotate will immediately be checked

by said riffle-boards, and its flow will be directed upwardly through the pipe 4 and out through the opening 16, provided at or near its top. I prefer to arrange the riffle-boards 15 tangentially to the hub 7 respectively, as best shown in Fig. 2, so that each riffle-board will extend from the circumference of the apparatus to a point forward of its center with respect to the direction in which the shaft 8 rotates, the object of this construction being to present to the ascending column of water a series of surfaces slightly inclined in such manner that all circumferentially-flowing currents will be deflected by said surfaces toward the center of the apparatus where the centrifugal action is the least, so that the tendency of the water-column to rotate as a whole with the propellers will be neutralized and all the power applied will be utilized in lifting said column. I also prefer to provide spaces 17 between each propeller 2 and the adjacent riffle-boards 15 sufficiently wide to afford clearance for the largest solid substances which can pass through the strainer 13 in order to avoid injury to the propellers.

In Fig. 4 I have indicated an arrangement whereby my apparatus may be adapted to be used for raising water to considerable heights, as is often desirable in carrying on mining operations and the like. According to this arrangement the pipe system 4 is offset at suitable intervals, as at 18, and is independently supported at each offset. Each portion of said pipe 4 between two offsets is provided with a separate shaft 3, carrying any desired number of propellers 2, said shafts being driven simultaneously by any suitable means. As thus constructed each shaft and the propeller or propellers carried by it serve to lift the water from one offset portion 18 to the next, the head of water in any section of pipe 4 being thus prevented from exerting pressure upon the pipe and propellers below such section, while the total weight of the column of water and of the apparatus itself is divided and independently supported at a suitable number of points.

By employing the unit construction described my apparatus may be made very portable and can readily be set up at any desired place and made of any desired height, according to the circumstances in which it is to be used. For example, when used in pumping out wrecks it can be suspended by its top from the boom or mast-head of the wreck or of a lighter and raised or lowered bodily at will. It may also be used effectively for lifting water charged with grain, coal, or the like, as in emptying wrecks, as it has no valves or similar parts which might be clogged or obstructed by any solid substance contained in the water which is drawn through it, and it is thus well adapted for dredging on muddy, sandy, or gravelly bottoms. In such cases the strainer 13 will have a mesh corresponding to the coarsest solid material which is to pass through it, and the powerful currents

produced at and near said strainer by the suction due to the action of the propellers as they force the water up through the pipe will loosen the adjacent material by their erosive action and carry it in suspension into the apparatus and out through its open top.

It will be evident that my apparatus may be considerably modified in various details without departing from my invention and that it may be set up and operated at any desired angle instead of vertically.

I claim as my invention—

1. In an apparatus of the character described, the combination of a pipe, a shaft journaled therein, one or more propellers secured to said shaft, and one or more longitudinal riffle-boards secured within said pipe, each extending from the circumference thereof to a point forward of its center with respect to the direction of rotation of said shaft, for the purpose set forth.

2. In an apparatus of the character described, the combination of a series of pipe-sections secured together at their ends, a bearing located at each end of each pipe-section and united thereto by integral ribs forming riffle-boards, each riffle-board extending from the circumference of its pipe-section to a point forward of the center thereof, a sectional shaft journaled in said bearings, and a series of propellers secured to said shaft between the bearings located at the adjacent ends of each pair of pipe-sections and supported on said bearings, spaces being provided between said propellers and the adjacent riffle-boards, substantially as described.

3. In an apparatus of the character described, a pipe-section provided at each end with a flange, a bearing, and one or more radial riffle-boards, a shaft-section journaled in said bearings, and a propeller secured to the upper end of said shaft and supported on the adjacent bearing, the hub of said propeller forming a coupling adapted to receive the interlocking end of an adjacent section of shaft, substantially as described.

4. In an apparatus of the character described, the combination of a series of pipe-sections detachably secured together and provided respectively at each end with a flange and a central bearing secured thereto by radial ribs, forming riffle-boards, a corresponding series of shaft-sections journaled in said bearings and provided with detachably-interlocked ends, and a propeller secured to each shaft-section and supported on the upper bearing of the corresponding pipe-section, between the adjacent sets of riffle-boards, substantially as described.

In testimony whereof I have hereunto subscribed my name this 27th day of February, 1901.

GEORGE A. FARWELL

Witnesses:

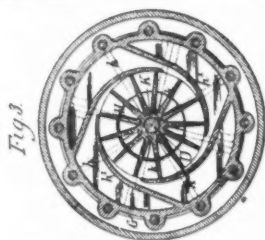
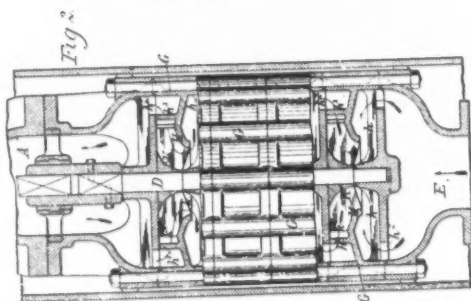
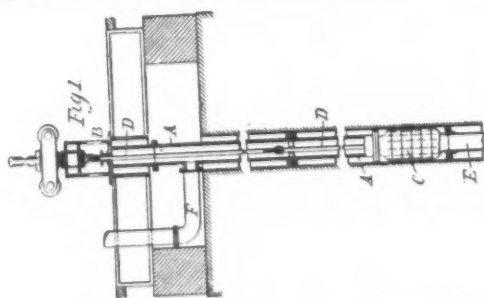
GEO. W. SHERMAN,
E. D. CHADWICK.

Defendants' Exhibit "J."

[Endorsed]: No. 485—Eq. Defts. Exhibit "J."
Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A.
Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals
for the Ninth Circuit. Filed Jan. 6, 1921. F. D.
Monckton, Clerk.

(This Drawing is a reproduction of the Original and is reduced scale)



[Third Edition.]

No. 24,430

A. D. 1894

Date of Application, 15th Dec., 1894—Accepted, 19th Jan., 1895.

COMPLETE SPECIFICATION.

Apparatus for Pumping Well Bores.

I, WILLIAM MATHER, of Salford Iron Works, Manchester, in the County of Lancaster, Member of Parliament, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

- 5 My invention relates to apparatus for pumping water from well bores so arranged that the pump can be readily adjusted in position and power to suit greater or less depths of bore.

For this purpose I extend down the bore a pipe which is the delivery pipe of the pump and in this pipe there is a spindle which is driven at the top of the well by
10 any suitable motor, and which works a rotary pump or special construction attached to the pipe.

Fig. 1 of the accompanying drawings is a vertical section of the bore, pipe, spindle and pump; the other figures shew to an enlarged scale the construction of the pump. Fig. 2 being a longitudinal section partly in elevation and Fig. 3 a
15 transverse section shewing the revolving blades and the fixed spiral and radial guides, the radial guides being shewn by dotted lines.

Referring first to Fig. 1, A is the pipe which extends down the bore from a framing B at the top of the well and carries at its lower end the pump C. In the pipe, guided by suitable bearings revolves the spindle D which drives the blades of
20 the pump.

Water drawn up the suction pipe E flows up the vertical pipe A and out by a lateral branch F.

The pump consists of a number of disc shaped segments G bolted together, and to the end segments of which are bolted respectively the suction pipe E and the
25 discharge pipe A. In each of the segments G there is a partition H which does not reach to the centre but leaves an annular passage around the boss K of the wheel. On the suction side of the partition H as shewn in Fig. 2 are radial ribs h on the other side there are spiral guide ribs h^1 , and through one side of the section there are holes h^2 opening into the spaces between the radial ribs of the next
30 section in order. In each section on the one side of the partition revolves a wheel consisting of a boss K keyed on the spindle D and a number of blades projecting from the boss. Each blade, a section of which is shewn in Fig. 4, has its part k which is next the boss projecting into the annular space within the partition H, the other part k^1 revolves between the partition H and the face of the next section in
35 order. Water, entering by the holes h^2 in the lowest section, is by the parts k of the first set of blades caused to pass up beyond the first partition and driven by the parts k^1 of the blades along between the spiral guides h^1 , thence through the holes h^2 into the next section where its rotating motion is first arrested by the radial ribs h, and then it is again acted on by the blades of a second wheel,
40 thus receiving repeated impulses until it issues from the highest section into the pipe A with sufficient pressure to overcome the column above it.

When the level of water sinks in the bore, the pipe A is lengthened and the pump has sections and wheels added to it so as to give the water sufficient pressure to overcome the increased column.

[Price 6d.]

Mather's Apparatus for Pumping Well Bores.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, I would have it understood that I do not make any general claim to the construction of the segments and wheels of the pump, as pumps operating in the manner described are already known, but what I claim is:—

Apparatus for pumping well bores consisting of a delivery pipe extending down the bore, carrying at its lower end a pump of the kind described, and having in it a spindle on which the wheels of the pump are keyed, substantially as described.

Dated this 15th day of December 1894.

ABEL & IMRAY,
Agents for the Applicant.

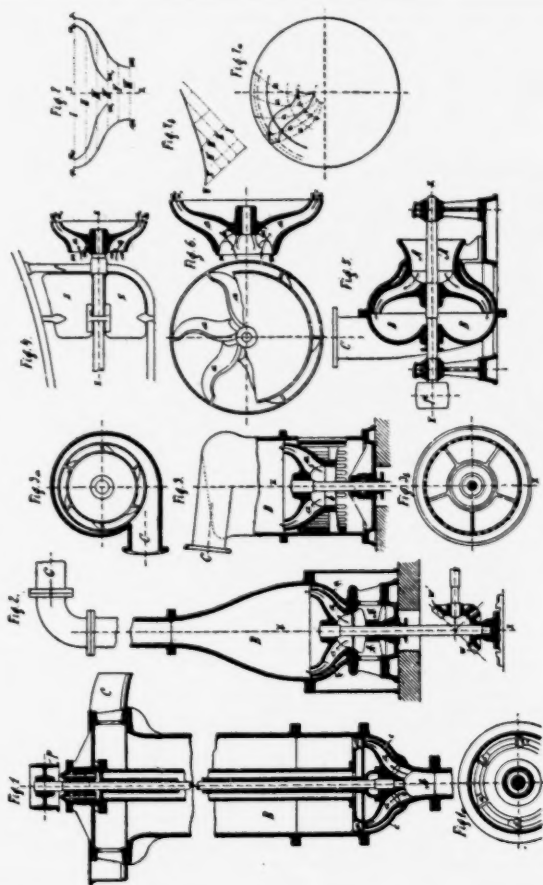
Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.

[Wt. 3—50/7/1915.]

Defendants' Exhibit "K."

[Endorsed]: No. 485—Eq. Defendants' Exhibit "K." Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monekton, Clerk.



[This Drawing is a reproduction of the Original on a reduced scale]

[Third Edition.]

A. D. 1885, 27th October. No. 12,886.

PROVISIONAL SPECIFICATION.

Improvements in Propellor-wheels for Pumps, Ventilators, and Propellers in Water and Air.

I, LADISLAV VOJACEK, of Smichov Prague, Bohemia, in the Empire of Austria, Engineer, do hereby declare the nature of this invention to be as follows:—

The object of my Invention is the construction of a propeller by which any fluid, water or air is caused to rotate energetically in screw thread streams after it has left the wheel, the blades and sides of which are so formed, that the double inclination acts in combination with the centrifugal force.

My wheel is composed of a number of equal and equally distant blades, enclosed between two concentrical casings, so as to form helical conduits of a sinusoidal shape. If the fluid could flow only in planes laid through the axis, it would enter the inlet near the axis and parallel to the same, then it would proceed with continually increasing inclination till a certain limit were reached, after which the inclination would gradually diminish till at the outlet it would be nil.

The blades are helical, their surfaces being formed through a combined movement of a curve. This is a plane curve; it is drawn in a plane which is perpendicular to the axis of rotation. This plane is supposed to move in the direction of the axis, and at the same time to rotate around it, both movements standing in a geometrical connection to each other.

I form this surface with a horizontal plate pattern which contains the generatrix which turns on a vertical spindle with pin, allowing free motion in the direction of the axis of rotation. The generatrix pattern slides at the same time on a screw thread pattern fixed to the same horizontal plate or board with the spindle.

By the combination of these patterns with the rotating patterns for the concentrical casements—these patterns being of the said sinusoidal shape—it is easy to produce the exact form for casting the blades.

In other cases the blades are cast of the required shape or they are shaped by pressure or by hammering. If the blades have the correct form, corresponding to the velocity, the fluid or air enters without shock in the centre of the wheel.

Owing to the form of the blades and casings in my propeller, the centrifugal force produced by the rotation of the wheels is utilised.

The propeller wheel throws out the streams of liquid in such a way that they form a hollow cylinder round the axis of rotation, though their direction is not

[Price 2s.]

[Price 6d.]

Vojacek's Improvements in Propeller-wheels for Pumps, &c.

parallel to that axis. Their inclination to the axis depends on the shape of the wheel and blades; on the velocity of rotation and on the difference of pressures. In the case of a pump or a ventilator the streams of liquid or of an escape into a concentric tube or casement. If the diameter of this tube remains constant i. e. nearly the same as the largest diameter of the wheel, the pitch of the thread will 5 remain nearly constant. The pitch will increase if the diameter decreases and vice-versa.

If a considerable height of delivery is required, the vertical cylinder casement is shaped so as to diminish gradually to the diameter of a vertical tube or pipe, mounted in the axis and upon the said casement. By this arrangement the pitch 10 of the thread in which the water rises from the wheel will steadily increase, till on its arrival and entry into the pipe, it will be so steep that practically it will flow straightway through the pipe which may then have any desired direction.

The screw thread motion of the issuing liquid has not heretofore been utilised.

It is to be understood that my propeller wheel will act as a reaction propeller 15 whether in water or in air.

In some cases either the internal or the external casement of the propeller may be dispensed with so that the blades will be open either outwardly or inwardly.

In other cases again the outward casement need not cover the whole line of the blades, a hoop or band only being left to connect and hold the blades together. 20

Dated 27th October 1885.

GEO. DOWNING,
Agent for Applicant.

COMPLETE SPECIFICATION.

Improvements in Propeller-wheels for Pumps, Ventilators, and Propellers in Water and Air.

I, LADISLAV VOJACEK, of Smichov Prague, Bohemia, in the Empire of Austria Engineer, do hereby declare the nature of my said invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

- 5 The object of my Invention is the construction of a new description of propeller by which water, air, or any other fluid, may be caused to rotate energetically in helical streams, after leaving the wheel or propeller, the blades and sides of which are so formed, that the two fold result acts in combination with the centrifugal force.
- 10 My improved propeller which is composed of a number of equal and equi-distant blades, enclosed between two concentric casings, so as to form helical conduits of a sinusoidal or sinuous form. If the fluid could flow only in planes laid through the axis, it would enter the inlet near the axis, and travel parallel to the same; then it would proceed, with continually increasing inclination until a certain limit were
- 15 reached, after which this inclination would gradually diminish until at the outlet it would be nil.

- The blades are helical, their surfaces being formed through a compound delineation of a curve. This is a plane curve; and is drawn in a plane which lies perpendicular to the axis of rotation. This plane is supposed to move in the
- 20 direction of the axis, and at the same time to rotate around it, both movements standing in a geometrical relation to each other.

- I form this surface with a horizontal template cut to the curve necessary for obtaining the required form, and which template is revolved on a vertical spindle with a pin, allowing free motion in the direction of the axis of rotation. The
- 25 generating pattern or template slides at the same time on a screw thread fixed to the same horizontal plate or board with the spindle. By the combination of these patterns or templates with the rotating patterns or templates for the concentric casing—the patterns being of the said sinusoidal form, the exact forms for casting the blades are obtained.

- 30 In other cases the blades are cast of the required shape or they are shaped by pressure or by hammering. If the blades have the correct form, corresponding to the velocity, the fluid or air enters without shock in the centre at the wheel.

Owing to the form of the blades and casing in my propeller, the centrifugal force produced by the rotation of the wheels is utilised.

- 35 The propeller wheel throws the streams of liquid outwards in such a manner that they form a hollow cylinder round the axis of rotation, through their direction may not be parallel to that axis. Their inclination to the axis depends on the form of the wheel and blades; on the velocity of rotation; and on the difference of the pressures.

- 40 In the case of a pump or a ventilator, the streams of liquid or of air escape into a concentric tube or casing. If the diameter of this tube remains constant that is to say, nearly the same as the largest diameter of the wheel, the pitch of the helice will remain nearly constant. The pitch will increase if the diameter decreases, and vice-versa.

Vojacek's Improvements in Propeller-wheels for Pumps, &c.

If a considerable height of delivery is required, the vertical uptake or pipe is so formed as to diminish gradually in diameter, thus forming a vertical tube or pipe, mounted concentrically above the casing. By this arrangement the pitch of the helix in which the fluid rises from the wheel, will steadily increase until, on its arrival and entry into the pipe, it will be so great that, practically, it will flow straight through the pipe, which may thus have any desired direction.

This helical motion of the issuing fluid has not heretofore been utilised.

It is to be understood that my propeller wheel will act as a reaction propeller, whether for water or air.

In some cases either the internal or the external casing of the propeller may be so dispensed with so that the blades will be open either outwardly or inwardly. In other cases again the outward casing need not cover the whole line of the blades, a hoop or band only being left to connect and hold the blades together.

And in order that my said invention may be more particularly described and ascertained, reference is hereby made to the accompanying drawings, in which 15 similar letters of reference indicate corresponding parts.

Fig. 1. Is a sectional elevation of a propeller-wheel-pump, with vertical axis, suitable for small heights of delivery.

Fig. 1^a is a horizontal section of the same shewing the directing blades $a1$.

Fig. 2 is a sectional elevation of a propeller-wheel-pump for considerable heights 20 of delivery.

Fig. 3 is an elevation, partly in section of a propeller-wheel-pump with vertical axis and low pitch.

Fig. 3^a is a horizontal view of the propeller wheel, shewn in Fig. 3.

Fig. 4 shews the application of my propeller-wheel to a boat.

25

Fig. 5 is a sectional elevation of a propeller-wheel for a ventilator.

Fig. 6 is a front view and section of a propeller-wheel shewing the shape of the blades and case; and Figs. 7, 7^a & 7^b show the geometrical construction for practically obtaining the exact forms of blades and casing of the propeller.

My propeller wheel is composed of equal and equi-distant blades a enclosed in 30 two concentric curved discs m $m1$, n $n1$, forming the casing so as to furnish helical passages of a special form. This form is shewn in Fig. 7; x x being the axis of rotation, m $m1$ the inlet ports, and n $n1$ the outlet. The inclination of the curve to the axis is made very small, in the inlet as well as in the outlet, and it gradually increases towards the middle between the two ends.

35

The blades a are formed by a horizontal generating template u shown in Fig. 7^a. This template is turning round its axis, slides at the same time on a screw thread (Fig. 7^b) which is cut out from a cylindrical plate, each point of which is at an equal distance from the axis of rotation.

The forms of the propeller wheel, shown in Fig. 6 and other figures, ensue 40 through the combined action of the before mentioned templates, with the rotating patterns or templates for the concentric casing. It is therefore easy to construct the geometrical forms for castings, or to cast matrices for pressing or hammering.

In other cases matrices or templates of wood or other suitable material may be prepared by turning bodies of the form m n $n1$ $m1$, in Fig. 7, with circles I, II, 45 III etc. It is easy to draw meridians on the surface of such bodies and to construct the outward lines of the blade as shewn in Fig. 7^a. After this the facing of the blade can be cut to the exact form.

The forms of the patterns are dependent on each other, and calculated in such a way that the body of the fluid which by the rotation of the wheel, is caused to 50 pass through the same, does not exercise any pressure on the casing. Each particle of this fluid in passing through the wheel, is supposed to describe a line which lies completely in a rotating surface of the form m n , $m1$ $n1$ or between the same.

The fluid enters the wheel without shock, and it leaves it with a certain 55 inclination, which depends on the velocity of the wheel; on the pressure; and on

Complete
Specification

A. D. 1885.—No. 12,886.

Vojacek's Improvements in Propeller-wheels for Pumps, &c.

the shape of the blades. The inclination can therefore practically be varied, from about five to about sixty degrees.

If machines of the kind known as centrifugal pumps, or ventilators, are required, the blades are arranged so that the inclination will be small. In such cases, the liquid will flow out in a spiral curve or helice, which is nearly perpendicular to the axis of rotation. Otherwise if the inclination of the spirally ascending body is considerable, say exceeding 30 degrees, for instance, it is preferable to replace the outlet tube by a cylinder B, in the manner shown in Figs. 1 & 2. The particles of fluid will ascend in such a manner, as to form a hollow cylinder, concentrically to the axis of rotation, and each particle of fluid is caused to ascend spirally, thus exercising great pressure in the direction of the axis of rotation.

In some cases fixed distributing blades $a^1 a^1$ are used as shown in Fig. 1. The whole arrangement resembles a turbine, the fixed blades of which are placed behind the wheel instead of before it.

Fig. 2 shows an arrangement for effecting a considerable height of delivery. The vertical case B is shaped so as to diminish gradually into a vertical tube or pipe, which is mounted above the case. The pitch of the helice, with which the particles of fluid ascend, will steadily increase, and after its arrival into the pipe, it will be so vertical that practically it will flow straight through the pipe, which will then conduct the flow upwards.

The helical motion is also produced in those forms of my machines, which act similarly to the ordinary centrifugal pumps, ventilators or exhaustors; and of which two examples are shown in Figs. 3 and 5. The effect of this arrangement will be the production of the helical motion of the fluid in the tube C, which is the chief feature of my invention. By this arrangement the head of liquid is increased, in the like proportion as the weight lifted on an inclined plane increases, in proportion to the weight which would be lifted by the same power in a vertical direction. This is especially the case in turbine-like arrangements which are represented in Fig. 1. The helical motion in the tube C (Figs. 2, 3 and 5) has, besides this, an effect similar to the rotary motion of projectiles from rifled guns, or the vortex motion of a cyclone in proportion to that of an ordinary storm. By this arrangement, liquids can pass through the tubes with a velocity of 3 to 5 meters a second, while in the ordinary way hardly the half of that speed can practically be reached.

Fig. 4 shows my wheel attached to a boat as a propeller, which will be understood without further explanation. It can also be used either in water or in air. The dimensions and the details differ. The centrifugal force, which in ordinary propellers is injurious, will thus be used up, and will cause a considerable increase of the effect. The particles of liquid or air will not disturb each other on their way, and the whole will act as a complete propeller, which is very well protected by the outer case, and strengthened by the inner one.

It is obvious that some portion of the case may be dispensed with in some of the applications of my invention.

In using my propeller wheel for pumps or ventilators, I arrange it so that the liquid or air under pressure shall not be allowed to escape on the outward surface of the propeller. This object is secured by providing the inlet with a metallic collar, to fit the case; and is lubricated, if necessary, so as to produce the least friction possible. These collars may also be adjustable for diminishing the wear and tear.

Vojacek's Improvements in Propeller-wheels for Pumps, &c.

50 Having now particularly described and ascertained the nature of my said
Invention and in what manner the same is to be performed I declare that
what I claim is:—

1. The manufacture and use of propeller wheels, with two concentric plates
forming a casing of the form shewn with specially shaped blades, substantially as
55 hereinbefore described and shown on the drawings.

2. The method and means of obtaining the exact geometrical forms of the blades,
substantially as hereinbefore described and shewn on the drawings.

3. The method of and means and appliances for producing in pumps, ventilators
and exhausters, the helical motion of liquid or air, and of utilising such motion for
the transmission of the fluid, either in the direction of the axis of rotation or in 5
any other direction, substantially as hereinbefore described and shown on the
drawings.

4. In connection with pumps, ventilators or exhausters, as aforesaid the use of
the collar fittings to the propeller, with its fixed casing, to prevent the liquid or air,
under pressure, from escaping on the outward surface of the propeller, substantially 10
as hereinbefore described and shewn on the drawings.

5. The application of my said wheels as propellers of boats or ships in water or
air, substantially as hereinbefore described and shown in the drawings.

Dated 27th July, 1886.

GEO. DOWNING, 15
Agent for Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.
[Wt. 15—50/7/1913.]

Defendants' Exhibit "L."

[Endorsed]: No. 485—Eq. Defts. Exhibit "L."
Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A.
Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals
for the Ninth Circuit. Filed Jan. 6, 1921. F. D.
Monckton, Clerk.

AM. NOV. 13. N. 2774.
MOON'S SPECIFICATION
(3rd Edition)

(2 SHEETS)

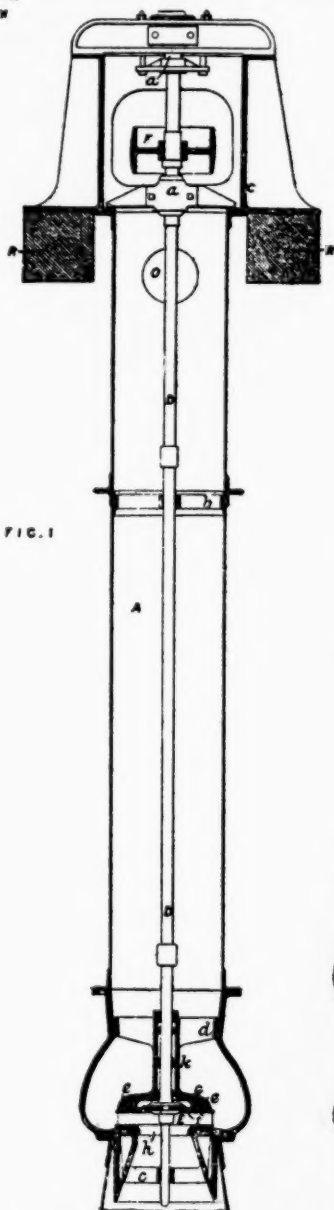


FIG. 1



FIG. 2.

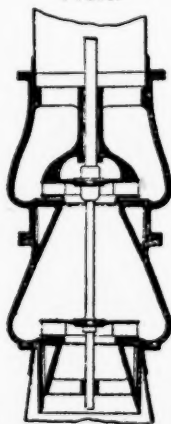


FIG. 3.

[Third Edition.]

A. D. 1860, 13th November. No. 2774.

ROTATORY PUMPS.

LETTERS PATENT to David Thomson, of Grosvenor Road, Pimlico, for the Invention of "Certain Improvements in Rotatory Pumps for Raising Water and Other Liquids."

Sealed the 10th May 1861, and dated the 13th November 1860.

PROVISIONAL SPECIFICATION left by the said David Thomson at the Office of the Commissioners of Patents, with his Petition, on the 13th November 1860.

I, DAVID THOMSON, of Grosvenor Road, Pimlico, do hereby declare the nature of the said Invention for "Certain Improvements in Rotatory Pumps for Raising Water and other Liquids," to be as follows:—

Firstly, in causing the liquid that is being pumped to support the weight of the vertical driving shaft, or such portion of it as may be desired, or in certain cases to relieve one side of the revolving wheel of pressure, so that it may be entirely in equilibrium, which is accomplished by forming a communication between a portion or the whole of the top side of the revolving wheel, and the bottom or suction side at which the water is drawn in. The liquid in the rising main pipe being prevented from returning into the revolving wheel by a fixed plate placed immediately over it, and fitting close to the upper surface of the revolving wheel at one part. Secondly, in fixing the aforesaid plate and the requisite guides for the vertical shaft, seats are provided for them in the pipe in such a manner that the whole of the working parts can conveniently be removed and replaced without disturbing the body of the pump, whilst the said pump is immersed in the liquid.

This second part of my Invention is applicable to rotatory pumps, which draw the liquid from both sides of the revolving wheel.

[Price 8d.]

[Price 6d]

Thomson's Improvements in Rotatory Pumps.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said David Thomson in the Great Seal Patent Office on the 11th May 1861.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, DAVID THOMSON, of Grosvenor Road, Pimlico, send greeting. 5

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Thirteenth day of November, in the year of our Lord One thousand eight hundred and sixty, in the twenty-fourth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said David Thomson, Her special licence that I, the said David 10 Thomson, my executors, administrators, and assigns, or such others as I, the said David Thomson, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and 15 Ireland, the Channel Islands, and Isle of Man, an Invention for "Certain Improvements in Rotatory Pumps for Raising Water and other Liquids," upon the condition (amongst others) that I, the said David Thomson, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain 20 the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said David Thomson, do hereby declare 25 the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say:—

My improvements are applicable to rotatory pumps acting on the centrifugal principle, and their object is to remove a difficulty hitherto experienced in the 30 use of such pumps, namely, that if the pump is placed above the liquid to be pumped a valve is required in the suction pipe to enable the pump to be charged before it can commence work. The valve, especially when pumping muddy or impure water, is continually liable to derangement, and being under water is very difficult of access, and thereby causes a great objection to the use 35 of this form of pump. To obviate these objections, I have often made these pumps with the revolving spindle vertical, and the pump itself placed under water, thereby obviating the necessity of using any valve whatever, and this form of pump I have found to act well, but it is liable to this disadvantage, that before

Thomson's Improvements in Rotatory Pumps.

it can be fixed the liquid in the well or reservoir must be lowered to a point below the level where the pump is intended to be fixed, and it must in like manner be lowered to this level whenever access is required to the pump for examination or repair. In all cases thus lowering the level of the water is
5 attended with inconvenience and expense, and my present Invention consists in so altering the arrangement and construction of the pump as to enable me to fix and work the pump under water, and thereby obviate the necessity of using any valve whatever, while at the same time I am enabled to fix or remove the whole pump or the working parts separately, whilst the liquid in
10 the well or reservoir remains at its ordinary level, entirely covering the working parts of the pump. This is effected by fixing the requisite guides for the vertical shaft or spindle in seats provided for them in the rising main pipe, in such a manner that they, and also the whole of the working parts, can be conveniently removed and replaced without disturbing the body of the pump, and
15 whilst the said pump is immersed in the liquid.

Another part of my Invention consists in causing the liquid that is being pumped to support the weight of the vertical driving shaft, or spindle, or such a portion of it as may be desired, or in certain cases to relieve one side of the revolving wheel of pressure, so that it may be entirely in equilibrium, which is
20 accomplished by forming a communication between a portion or the whole of the top side of the revolving wheel and the bottom or suction side of the same at which the water is drawn in, the liquid in the rising main pipe being prevented from returning into the revolving wheel by a fixed plate placed immediately over it and fitting close to the upper surface of the revolving
25 wheel at one part.

But in order that my invention may be more easily understood and readily carried into effect, I will now describe the best means I am acquainted with of performing the same, reference being had to the accompanying Drawing.

Figure 1 represents a vertical section of my improved pump; Figure 2
30 represents an inverted sectional plan of the revolving wheel. A is the rising main pipe, to the bottom of which is attached the pump chamber B; at the top the rising main pipe is fixed to the framing C, provided with the bearings *a*, *a*¹, in which the vertical pump spindle D works. This passes down the centre of the rising main pipe A into the pump chamber B, where it is
35 attached to the rotatory fan E, while at the top it is provided with the drum F, through which the fan receives its rotatory motion. The guides *b*, *d*, and *c* are fitted into conical seats provided for them in the rising main pipe and at the bottom of the pump chamber.

The rotatory fan E is fixed on the spindle D, as shown. An inverted sec-

Thomson's Improvements in Rotatory Pumps.

tional plan of this fan or wheel is shewn at Figure 2 with the arms as usually made; but I do not confine myself to any particular form of the arms. The revolution of this fan or wheel in the direction of the arrow when covered with liquid expels the same round the circumference of the wheel, causing it to ascend in the rising main pipe, whilst it draws in fresh liquid at the centre 5 opening *h*. On the top of the revolving fan or wheel is formed a small projecting rim *e*, fitting closely to the plate *G*. This rim prevents the water from the rising main passing into the centre part of the top of the revolving fan except in such small quantities as can leak through between the plate *G* and the rim *e*, or down the pipe *k*, through which the spindle passes. To provide 10 for the escape of such water as may leak through the small holes *f, f*, are made in the top plate of the revolving wheel, and through these the leakage passes into the body of the revolving wheel, and thence passes into the rising main. The water raised through the rising main is discharged through the opening *O*, placed at any convenient part of it.

15

In fixing this pump it is necessary that the revolving wheel should be under the level of the liquid to be pumped, and the pump being entirely fixed to the girders or other framing *R, R*, at the top; it can be so fixed or removed at whatever height below that point the liquid may stand. The guides *b, d*, and *c*, which rest on conical seats are made so that each guide will pass through the 20 conical seats above it, by which means the whole may be drawn out or replaced from the top, whilst the seats themselves are under water.

The pump as now described even without the holes *f, f*, and plate *G* attached to the guide *d* would discharge the water and effect the main object of my In- 25 vention, but in that case the whole upper surface of the revolving wheel being exposed to the pressure of the liquid in the rising main pipe, whilst a portion of the lower surface equal to the area of the central opening *h* is exposed to a less pressure or partial vacuum; this excess of pressure on the upper side of the fan or revolving wheel would cause a great additional friction on the upper bearing *a* which carries the weight of the revolving parts. By the addition of 30 the holes *f, f*, and plate *G*, and the rim *e*, as above described, the pressure of the liquid in the rising main is removed from that part of the upper surface of the revolving wheel which is contained within the rim *e*, and by making this rim of a larger diameter than the opening *h*, not only is the pressure of the liquid in the rising main removed from the bearing *a*, but a sufficient excess 35 of pressure is obtained on the lower side of the wheel to support or nearly support the weight of the revolving parts themselves. The friction in the upper bearing *a* is thus reduced to a minimum, which is of great importance when the speed is so great as is required for centrifugal pumps.

Thomson's Improvements in Rotatory Pumps.

Figure 3 in the accompanying Drawing shews one of my improved pumps with two revolving wheels placed in connection with each other, in such a way that the water discharged by the lower wheel passes into the suction part of the upper wheel; by this means I can raise water or other liquids to any
5 height with the same speed of revolution of the wheel that would be required for half the height with one wheel; and, if necessary, three or more wheels may be placed in conjunction in a similar manner with the effect of still further reducing the necessary speed of rotation.

Having now described the nature of my Invention, and in what manner the
10 same is to be performed, I wish it to be understood that I do not limit myself to the exact details as shewn on the accompanying Drawing, as these may be modified according to circumstances; but what I claim is,—

Firstly, the general arrangement of rotatory pumps as herein-before described, by which the before described objects of my Invention are effected.

15 Secondly, the arrangement as herein-before described, by which, in my improved rotatory pumps, the pressure of the water is removed from the bearings, and by which the weight of the revolving parts is also wholly or partially supported by the pressure of the column of water or other liquid in the rising main on the under side of the wheel.

20 Thirdly, the arrangement, as herein-before described, by which the revolving wheel and spindle, and the guides thereof, may be taken out or replaced without the necessity of taking the pump out of the liquid, and whilst the liquid covers the said working parts.

Fourthly, the employment of two or more of my before-mentioned improved
25 rotatory pumps conjointly, placed one over the other, with the guides fixed in conical seats, so that they can be removed or replaced while under water, as above described.

In witness whereof, I, the said David Thomson, have hereunto set my
30 hand and seal, this Eleventh day of May, in the year of our Lord One thousand eight hundred and sixty-one.

DAVID THOMSON. (L.S.)

Defendants' Exhibit "M."

[Endorsed]: No. 485—Eq. Defts. Exhibit "M."
Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A.
Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals
for the Ninth Circuit. Filed Jan. 6, 1921. F. D.
Monckton, Clerk.

No. 705,844.

Patented July 29, 1902.

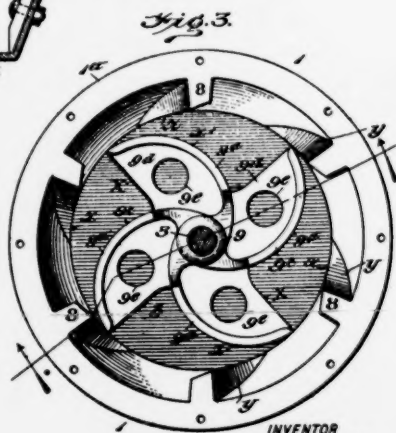
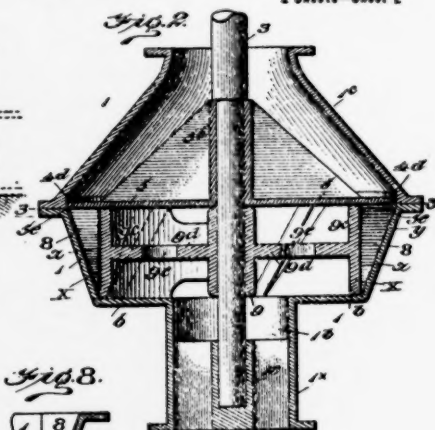
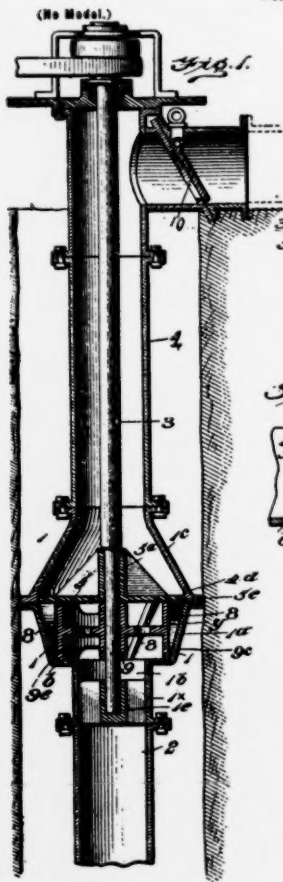
E. M. IVENS, Dec'd.

H. K. IVENS, Administrator.

PUMP MECHANISM.

(Application filed Apr. 30, 1901.)

2 Sheets—Sheet 1.



WITNESSES:

Wm. B. Listerick
Ray W. Worthington

INVENTOR
Edmund M. Ivens

BY
Frederick J. Listerick
ATTORNEY

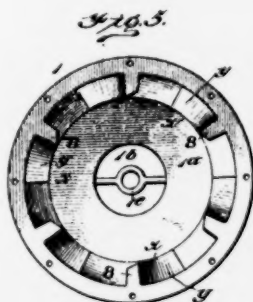
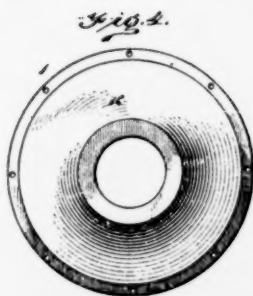
No. 705,844.

Patented July 29, 1902.

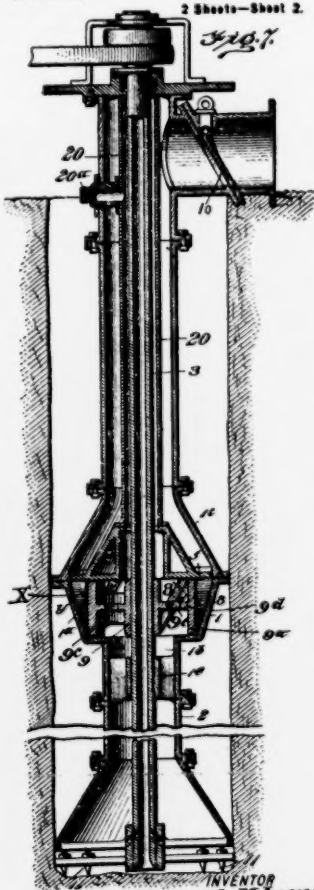
E. M. IVENS, Dec'd.
H. K. IVENS, Administrator.
PUMP MECHANISM.
(Application filed Apr. 30, 1901.)

(No Model.)

2 Sheets—Sheet 2.



H. S. Dietrich
Chas. W. Worthington



INVENTOR
Edmund M. Ivens

BY *Ed. J. Dietrich & Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

EDMUND MASTERS IVENS, OF NEW ORLEANS, LOUISIANA; HARRY K. IVENS, ADMINISTRATOR OF SAID EDMUND MASTERS IVENS, DECEASED.

PUMP MECHANISM.

SPECIFICATION forming part of Letters Patent No. 705,844, dated July 29, 1902.

Application filed April 20, 1901. Serial No. 56,725. (No model.)

To all whom it may concern:

Be it known that I, EDMUND MASTERS IVENS, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and Improved Pump Mechanism, of which the following is a specification.

My present invention is in the nature of an improved centrifugally-operating pumping mechanism adapted for use in deep wells and for lifting water from bayous and lagoons for irrigating purposes; and it comprehends, generically, a casing having a lift-pipe and a discharge-pipe connected thereto, a centrifugally-operating pump-disk held within the casing, and a specially-arranged means for passing the water through the casing in an annular and upwardly-inclined direction.

My present invention in its more complete make-up also includes a novel construction of casing cooperating with the disk blades to effect a more uniform and capacious lift action than has been heretofore possible with lift-pumps having the ordinary arrangement of turbine or centrifugally-operating suction-disks.

In its more subordinate features my invention consists in certain details of construction and peculiar combination of parts, all of which will hereinafter be fully explained, and particularly pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section showing my pumping mechanism especially designed for a low-lift pump. Fig. 2 is an enlarged vertical section of the casing and the centrifugally-operating pumping devices mounted therein. Fig. 3 is a horizontal section of the casing and the pump-disk, taken practically on the line 3 3 of Fig. 2. Fig. 4 is a plan view of the cap portion of the casing. Fig. 5 is a plan view of the base or receiving portion thereof. Fig. 6 is a plan view of the division bracket-plate that divides the casing into a lower receiving and an upper discharging compartment. Fig. 7 is a sectional elevation of a modified construction of my invention particularly adapted for deep wells. Fig. 8 is a detail view of a modified form of the stops, hereinafter referred to.

Referring to the accompanying drawings,

in which like numerals indicate like parts in all the figures, 1 designates a pump-casing, the peculiar construction of which, in combination with the rotary disk operating therein, forms the essential feature of my present invention. The casing 1 in practice is usually of such diameter as to permit its being slid down into the well-bore, and to facilitate its downward movement and for other reasons hereinafter explained its lower or entrant portion is made tapering, preferably on an angle of forty-five degrees to the walls of well-bore, as clearly shown in Fig. 1. The casing 1 consists of three parts—a lower receiving member 1a, in which the pump-disk operates and which has an inlet 1b, with which the lift-pipe 2 connects, an upper conical-shaped portion 1c for leading the fluid to the offtake-pipe 4, and a disk or plate 5, that divides the upper and lower parts of the casing and which also has a bracketed bearing 5a for the drive-shaft 3. In the preferred construction (best illustrated in Figs. 1 and 2) it will be observed the inlet 1b has a tubular pendant extension 1x, flanged to join with the lift-pipe and formed with the centrally-disposed step-socket 1e, in which the lower stepped end of the pump-shaft 3 seats when a solid shaft is used, as shown in Figs. 1 and 2. The socket 1e is in vertical alignment with the bearing 5a in the plate 5.

Upon the inner surfaces of the tapering sides of the part 1a of the casing is formed a number of inwardly-projecting lugs 8, the inner edges x of which are disposed in a vertical plane to oppose the outer vertical edges of the pump-disk, presently described and as best shown in Fig. 2. The front side of the lugs—i. e., the side against which the water is forced by the disk blades—inclines from the bottom of the casing forwardly in the direction of the disk rotation, preferably at an angle of forty-five degrees to the vertical axis of the pump-disk, whereby to produce annularly-inclined ways y (see Fig. 3) to deflect the fluid discharged against the said lugs annularly and upwardly to the discharge-openings 5e in the division-plate 5, the reason for which will presently appear.

When my improved pumping means is to be used for lifting water from bayous or la-

goons, it is desirable to have the guide-lugs 8 8 removably secured, whereby to provide for fitting on the casing lugs having a greater or less angle than forty-five degrees relatively to the side wall of the pump-casing, so as not to present a too abrupt stop or incline guide-surface, which might impede the passage of the debris that comes up with the water, and to provide for fitting the different lugs 8 8 in place they may be formed as separate members and bolted to the side walls of the casing, as shown in Fig. 8.

The pump-disk comprises a hub 9, held upon the shaft 3 to turn therewith, from which project in a horizontal plane a number (preferably four) of blades, the impact-faces of the pusher portion 9a of which in transverse elevation snugly fit the spaces between the rim of the inlet, the bottom b of the casing part 1a, the plate 5, and the straight bore or face of the guide-lugs 8 8, and the said portions 9a join with the hub 9 by a vertically-disposed shank 9c of reduced area and horizontal webs 9d, the webs 9d being, however, apertured, as at 9e, for a free passage of the fluid therethrough.

The plate 5, before referred to, comprises a body portion having a diameter equal that of the bore in which the disk blades travel, and said plate closes entirely over the pump-disk, it being provided with radial extensions 5e, that engage the inner vertical annular rim 4d of the cap-plate, as clearly shown in Figs. 1 and 2, said extensions serving to assist in properly positioning the plate, it being understood such plate is firmly held down by the shaft 3, that passes through its central bearing and the fluid-pressure on the top thereof. The pump-blades have their upper and lower edges held to run close against the plate 5 and the bottom of the casing, and to provide for the more effectively lifting the sand and fluid and thoroughly disintegrating the same and force same by centrifugal action against the wall of the casing the impact or pusher surfaces of the blades are vertical, as shown, and the said blades in horizontal plane are curved on a circle eccentric to the axis of the disk, with their outer or impact surfaces α' merging with the circle of the hub, as clearly shown in Fig. 3.

By constructing the pump-disk and the casing in the manner described the water-column reaches the pump-disk perpendicular and then passes off toward the annular casing-wall without a turn, and by reason of the radial inwardly-projecting stops disposed at an angle from the bottom of the casing the fluid is caused to pass up annularly at an angle of forty-five degrees, more or less, toward the outlets and through the said outlets into the conical cap portion, from whence it passes up into the outlet-pipe, which above the ground line has a discharge-lateral having a back-check valve 10, as shown.

For deep wells and for sinking wells my improved construction of pumping disk and

casing can be also advantageously used. For such purpose the casing is slightly modified, as shown in Fig. 7, by reference to which 70 it will be seen the pendent shaft bearing in the lower casing-section is tubular to permit the shaft 3 to pass down through it to the bottom of the well. In this case the hollow drive-shaft 3 also serves as a means for feed- 75 ing a loosened agent to the bottom of the well, and upon the lower end said shaft carries a disintegrating means consisting of radial toothed arms 11. In this latter form the lower end of the lift-pipe has a conical re- 80 ceiver to guide the mixed sand, gravel, &c., up into the said lift-pipe. When the disintegrator mechanism is used, a supplemental pipe 20 is mounted within the outlet-pipe that discharges into the top of the casing and 85 has a lateral supply-nozzle 20a, that projects through the outlet-pipe and terminates in a nozzle to receive the water-feed hose or pipe. The object in providing the supplemental pipe 20 is to aid in keeping the material 90 separated from clogging within the casing and pump-disk.

The disintegrating means above referred to have been described in my present application to illustrate the adaptation of my improved mechanism for deep wells, and the said disintegrating means *per se* form no part of my present invention, as they are fully disclosed in and form a part of my Patent No. 682,939, dated September 17, 1901. 100

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a pump mechanism as described; a lifting-pipe, and an outlet-pipe, a casing joining 105 the two pipes, having a central inlet at the bottom joined with the lift-pipe, and annularly-disposed outlets discharging into the outlet-pipe, projections on the inner surfaces of the casing, whose inner edges are in a 110 plane vertical with the pump-disk, said projections being inclined in the direction of the movement of the pump-disks, from the bottom of the casing up to the outlets, and a centrifugally-acting pump-disk, operating with 115 pump-casing, whose blades have vertically-disposed projecting surfaces, and whose outer extremities are held to travel close up to the vertical face of the casing projections, all being arranged substantially as shown and for 120 the purposes described.

2. In a pump mechanism as described, a pumping-casing, having a central bearing, and annularly-disposed outlets at the top, an offtake-pipe into which all of the outlets discharge, said casing having a single central inlet at the bottom, a shaft engaging the casing-bearing, a centrifugally-operating pump-disk thereon, whose blades have vertical outer edges, and curved impacting surfaces, adapted 130 to throw the fluid toward the casing-wall, guide-lugs projected inwardly from the casing, having their inner face in a vertical plane to oppose the outer vertical edge of the

disk blades, said guide-lugs being inclined from the bottom of the casing up to the annularly disposed discharge openings of the casing, substantially as shown and for the

5 purposes described.

3. In a pump mechanism as described, the combination with the casing, and the centrifugally-operating pump-disk held therein, said casing having an outlet at the top, and an
10 inlet in the bottom, an offtake-pipe connected with the outlet, and a water-feed discharging into the top of the casing for mixing up the material lifted by the pump-disk into the casing, for the purposes described.

15 4. In a mechanism as described, the casing, the centrifugally-operating pump-blades, said casing having an annular outlet and an offtake-pipe at the top, and a central inlet at the bottom, a water-feed pipe held within
20 the offtake-pipe, discharging into the casing, and having a feed-lateral at the upper end, projected outside the offtake-pipe, substantially as shown and described.

5. The combination with the casing, comprising a lower part having converging sides, and a central opening in the bottom, and an annular discharge in the top, an upper or cap member extended over the annular discharge and terminating with an offtake, the upper
30 and lower members having central bearing portions, the casing having a series of inwardly-projecting guide-lugs inclined from the bottom up, and in the direction of the movement of the pump-disk and having
35 straight inner faces; of the shaft 3, and the pump-disk mounted thereon to rotate therewith, said disk having radial webs terminating in blades, filling the lower part of the casing, their outer ends having straight edges to travel in close proximity to the straight faces
40 of the guide-lugs, substantially as shown and for the purposes described.

6. In a pump mechanism, including a casing, joined with the intake and offtake pipes,
45 and a centrifugally-acting pump, operating within the casing; of detachable lugs on the inner wall of the casing for deflecting the water-column upwardly at an angle, and annularly.

50 7. The combination with the intake and offtake pipes; of the pump-casing, said casing consisting of a bottom section, having its walls converging downwardly, said section having a central opening in the bottom into which
55 the lift-pipe discharges, a series of radially inwardly projecting guide-lugs on the wall of said casing section, said stops being inclined upwardly at an angle in the direction of the movement of the pump-shaft and having vertical faces, said lower section having an annular discharge with which the said lugs co-

operate, said discharge connecting with the offtake; of the shaft 4, the pump-disk mounted thereon, said disk comprising a hub, webs projected radially therefrom, blades forming an integral part of the webs, having their upper and lower edges running close to the top and bottom walls of the lower casing-section, and their vertical edges adapted to run close to the vertical face of the guide-lugs, all being arranged substantially as shown and described.

8. The combination with the intake and offtake pipes, and the drive-shaft; of the pump-casing, consisting of a lower section having a central pendent portion formed with a step-bearing to receive the drive-shaft, said lower section having its vertical wall diverging upwardly, a series of inwardly-projecting lugs on said wall, said lugs extending the full height of the said section, and inclined upwardly in the direction of movement of the shaft, and having their inner faces straight-faced, the pump-disk, having radial blades, whose upper and lower edges are adapted to run close to the top and bottom of the lower section, and its outer edges straight-faced, to run close to the straight faces of the aforesaid lugs, the top wall of the lower section having an annular discharge in line with the said lugs, and an upper casing-section, adapted to receive the fluid discharged from the lower section, and deflect it to the offtake, as set forth.

9. As an improvement in pumps of the character described, a pump-casing comprising a bottom part having a central inlet in the base thereof, a pendent portion joined with the inlet, and adapted to connect with the lift-pipe, said portion having a central bearing member 5, and a solid disk part of a diameter equal that of the pump-disk, and adapted to form the top of the disk-holding chamber of the casing, said member 5 also having radial projections 5a, to extend over the annular discharge from the disk chamber, a cap member 1c, the shaft 3, journaled in the bearings 5a and 1c, of the member 5 and the pendent portion aforesaid, respectively, the pump-disk having blades, whose upper and lower edges travel close to the plate 5, and the bottom of the disk chamber, and guide-lugs projected radially inward from the walls of the casing into the disk compartment thereof, the inner faces of which oppose the outer vertical edges of the disk blades, all being arranged substantially as shown and for the purposes described.

EDMUND MASTERS IVENS.

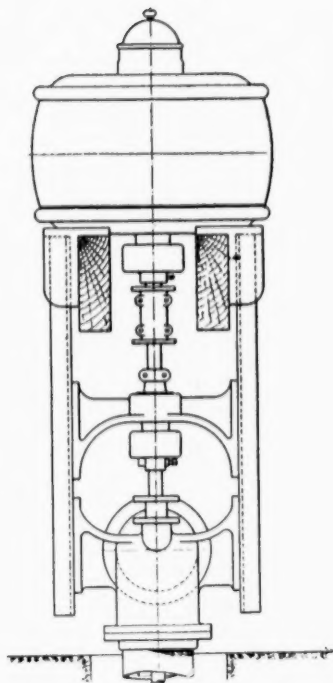
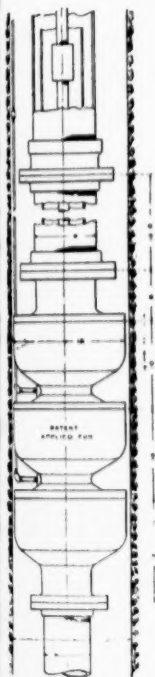
Witnesses:

J. N. BOLAND,
O. L. BOZEMAN.

vs. *Layne & Bowler Corporation.*

1063

Defendants' Exhibit "M-6."



General Remarks
31500. SERIES CENT. PUMP
TYPE 31500
FOR 100 H.P. 100000 G.P.M.
1000 PSI
SOL. TO 3000 H.P. 100000 G.P.M. 1000 PSI
WHEEL 100000 G.P.M.
1000 PSI
DANIEL W. HEAD
BYRON JACKSON MACHINE WORKS
2100 E. 10TH ST. CHICAGO, ILL.
SCALE 1/2" = 1'-0"
DRAWN BY J. L. HARRIS
CHECKED BY J. L. HARRIS
APPROVED BY J. L. HARRIS

[Endorsed]: Case No. 485. Defendants' Exhibit "M-6." Filed Feb. 25, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monckton, Clerk.

[Endorsed]: Case No. 485. Defendants' Exhibit "M-74." Filed Feb. 25, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monckton, Clerk.

Defendants' Exhibit "N."

[Endorsed]: No. 485—Eq. Defts. Exhibit "N." Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Dep. Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monckton, Clerk.

This Contract made March 24th, 1915, between Layne & Bowler Corporation, first party and S. M. Halstead, second party,

WITNESSETH:

That the following charges by the first party against the second party are correct:

| | |
|-------------------------------------|-----------|
| Balance on open account, as | |
| shown by first party's | |
| books | \$4080.16 |
| Note given for gas rig..... | 3500.00 |
| Note given for gas Engine..... | 500.00 |
| Bill for screen (not yet on ledger) | 624.24 |
| Balance due on Halstead and | |
| Vaughan Account | 383.24 |
| Note given 1/15/15 | 1766.87 |
| <hr/> | |
| Total | 10850.51 |

That the following credits to the second party are correct:

Credits shown first party's account called "S. M. Halstead Cash Report Account" ..\$1268.94

Second party's bills of following Date:

| | |
|----------------|-------|
| 10/28-14 | 29.22 |
| 10/28-14 | 61.00 |
| 11/20/14 | .60 |
| 11/24/14 | 30.05 |
| 11/20/14 | 23.12 |
| 10/ 1/14 | 62.60 |
| 2/ 1/15 | 59.00 |

Credit due second party on first party's over-charge on charge dated 2/5/15, No. 14-

564 80.65

Total 1615.18

Excess of said charges over said credits. . . \$9235.33

Conditional upon the second party's returning the Kirkwood pump to consignment in good shape, first party agrees to allow the second party a further credit of 1865.00

Net Excess of said charges over said credits\$7370.33

In settlement of the above, the first party agrees to accept the following: and the second party agrees to deliver the same:

| | |
|--|---------|
| Gas Rig mentioned above, for . . . | 2600.33 |
| Forty-nine (49) shares of Layne and Bowler Corporation stock for | 3920.00 |
| Gas Engine mentioned above for | 500.00 |
| Cash, represented by a seven per- cent (7%) interest bearing demand note of like date, with this instrument | 360.00 |
| | <hr/> |
| | 7370.00 |

Above mentioned Gas Rig and Gas Engine to be delivered f. o. b. cars San Jose, California.

It is morally understood that the said Three-hundred-fifty dollar demand note is to be paid as soon as the second party can straighten up his affairs in the North, and, if impossible for him to meet it all at that time, the balance is to be handled by monthly payments, but nothing herein shall strip the note of any of its qualities as a straight demand note.

In consideration of the second party rendering his personal services free of charge for closing up the first party's affairs in its so called Northern territory, the first party agrees to cancel all charges for use of its Automobile and furniture by the second party.

The second party hereby releases and grants back to the first party all his right, title and interest in that certain contract October 1st, 1914, between the

Layne & Bowler Corporation and S. M. Halstead and P. E. Vaughan; and in consideration of the premises, the first party hereby agrees not to charge any of the second party's accounts with any transactions which may be hereafter had under the said contract.

Executed in duplicate.

THE LAYNE & BOWLER CORPORATION.

By A. E. MULFORD,

2d Vice-President and Assist. Gen. Mgr.

First Party.

And S. M. HALSTEAD.

Defendants' Exhibit "O."

[Endorsed]: No. 485—Eq. Defts. Exhibit "O."
Filed Sept. 3, 1920. W. B. Maling, Clerk. By J. A. Schaertzer, Dep. Clerk.

THIS AGREEMENT, Made and entered into this nineteenth day of September, 1916, by and between the Western Well Works, Inc., a corporation organized and existing under and by virtue of the laws of the State of California, with its principal place of business at San Jose, California, hereafter known as the party of the first part, and the Layne & Bowler Corporation, a corporation organized and existing under and by virtue of the laws of the State of California, with its principal place of business at Los Angeles, California, the party of the second part.

WITNESSETH: That for and in consideration of One (\$1.00) Dollar, each to the other paid, the receipt whereof is herewith acknowledged, and in consideration of other valuable consideration moving to each of the parties, do hereby agree as follows, to wit:

(1) That on or before October 10th, 1916, the party of the first part agrees to, and will cause to be loaded by Southern Pacific Railroad Company, and consigned, charges collect, to the party of the second part at Los Angeles, California, (or such other shipping point as party of the second party may hereafter direct), a certain well rig and accessories thereto, in good workable condition, as covered by a certain inventory which is attached hereto and made a part hereof.

(2) The party of the first part further agrees to execute and deliver herewith, a good and sufficient bill of sale to the party of the second part, to a certain 40 H. P. high pressure mounted boiler, and a certain mounted steam draw-works, consisting of running gear, frame, steam engine, drum, sprockets, etc., the same now being situated in the yards of the party of the second part in Los Angeles.

(3) The party of the second part agrees to deliver herewith to the party of the first part, receipted memorandums cancelling indebtedness of any kind or nature, which the party of the second part may have against first party or S. M. Halstead of San Jose, California, or P. E. Vaughan of San Jose, California; and further agrees to deliver within five days to the Western Well Works, Inc. any notes or other evidence of indebtedness which S. M. Halstead or P. E. Vaughan, or either of them, may have given to the party of the second part, and which now remain unpaid.

(4) Party of the second part further agrees to deliver herewith a good and sufficient bill of sale of any right, title or interest which they may have in a

certain well drilling rig and equipment, now located at Salinas, California, in storage at Cornett's Brothers Yard, together with written orders upon Cornett Brothers to deliver said well drilling rig and equipment to the order of the party of the first part.

(5) Said second party further agrees to assume and pay all hauling charges which were incurred incident to the removal of the well rig from the Bardin ranch to Cornett Brothers Yard, and also pay all storage charges due to Cornett Brothers to date.

(6) The party of the first part agrees to dismiss the suit now brought at Salinas against the second party, and both parties hereto agree to relinquish any claim for damage or liability, which either party may have, the one against the other, arising out of such transaction.

IN WITNESS WHEREOF, said parties have hereunto set their hands and seals in duplicate the day and year first above written.

WESTERN WELL WORKS, INC.,

Per S. M. HALSTEAD.

[Seal of Western Well Works, Inc.]

LAYNE & BOWLER CORPORATION,

Per W. E. BOWLER,

Sec'y.

Witness:

NELLIE M. CALL.

B. L. ROBERTS.

Defendants' Exhibit "S."

In the United States District Court, Southern
District of California, Southern Division.

IN EQUITY—No. E-42.

LAYNE & BOWLER CORPORATION,
Plaintiff,

vs.

AMERICAN WELL & PROSPECTING COM-
PANY, ISAAC N. JOHNSTON and FRANK
R. GALBREATH, Doing Business as King
MACHINE & MANUFACTURING COM-
PANY,

Defendants.

Master's Report.

To the Hon. OSCAR A. TRIPPET, Judge of said
Court:

This is a suit brought November 18, 1919, in the District Court of the United States, Southern District of California, Southern Division, by the plaintiff Layne & Bowler Corporation, against American Well & Prospecting Company, Isaac N. Johnston and Frank R. Galbreath, doing business as King Machine & Manufacturing Company, for the infringement of Claims 9, 13 and 20 of letters patent of the United States issued to one Mahlon E. Layne, the assignor of the plaintiff, May 29, 1906, upon application for letters patent filed by him April 28, 1903, for a well mechanism, No. 821,653.

The evidence, unobjected to, while otherwise not altogether satisfactory, demonstrates that the plain-

tiff, Layne & Bowler Corporation, is the owner by mesne assignments of the patent issued to Mahlon E. Layne May 29, 1906, as aforesaid, and I therefore find that the plaintiff is the owner of the patent in suit and entitled as such to bring this action.

On the 8th day of December, 1919, a restraining order was entered herein that pending the hearing and determination of plaintiff's motion for a temporary injunction restraining and enjoining defendants as prayed in the bill of complaint, said defendants, and each of them, their attorneys, officers, agents, servants, employees, associates, confederates and workmen, and each and every one thereof, should be enjoined and restrained and commanded to desist from manufacturing, using or selling or causing to be manufactured, installed, used or sold any well mechanism embodying or containing the invention patented by letters patent No. 821,653, dated May 29, 1906, for well mechanism as particularly set forth in Claims 9, 13 and 20 thereof, or either thereof, which said claims are as follows:

"9. In well mechanism the combination with a pump casing, of a rotary pump of a jointed pump shaft and a closed casing surrounding the pump shaft from the pump to the top of the well."

"13. The combination with a pump and its actuating shaft of a sectional casing therefor provided at each end of each section with a fixed block with bearings for the shaft, the casing being closed at the top and provided with an air vent."

"20. The combination of a well casing, a ro-

tary pump therein, and a line shaft for the pump entirely closed off from the water in the well."

or any mechanism or parts thereof capable of or intended to be combined in well mechanism in infringement of said letters patent, particularly of either Claim 9, 13 or 20 thereof and that plaintiff's said motion for temporary injunction should be continued.

Subsequently on the 29th day of December, 1919, it was ordered that the cause should be referred to the undersigned as Special Master to hear the evidence and decide all the issues between the parties and make his report to this court, separately stating his findings of law and fact, together with all the evidence introduced before him, which evidence should become part of the record; with all powers as provided by the equity rules.

It was further ordered that said Special Master should have full power to hear and determine all motions or applications respecting amendments to the bill of complaint or answer, or any procedure, with the same effect as though made and determined by this court; and the motion to dissolve the restraining order theretofore made was likewise referred to said Special Master to be determined as said Special Master should order.

And being now ready to report in said matter pursuant to said orders aforesaid, I, Lynn Helm, appointed Special Master as aforesaid, do respectfully report that I have on divers and sundry days between the second day of January, 1920, and the date hereof, been attended by the several parties to said suit, the said plaintiff, Layne & Bowler Corporation by Frederick S. Lyon, Esq., and Leonard S. Lyon, Esq., at-

torneys for plaintiff, and said defendants by Charles C. Montgomery, Esq., and Raymond Ives Blakeslee, Esq., attorneys for defendants, and having heard all the evidence produced before me by said respective parties, and having heard the argument of counsel, and being fully advised in the premises, do report as follows:

At the time said reference was made to the undersigned, there was in full force and effect the restraining order hereinbefore mentioned, and thereafter and on several occasions the defendants moved to dissolve said restraining order, but following the practice laid down in — Fed. —, I declined to dissolve said restraining order until further evidence had been produced before me as to the right of said defendants to have said restraining order dissolved and accordingly continued said restraining order in effect.

There was at the time of the making of said restraining order no injunction bond required of the said plaintiff and on the tenth day of January, 1920, a motion was made by the defendants that plaintiff be required to give a bond and thereupon I made an order requiring said plaintiff as a condition of continuing said restraining order to file an injunction bond in the usual form in the sum of \$5,000, conditioned for the payment of any damages that the defendants should suffer by reason of continuing said temporary restraining order. This bond was accordingly given by the plaintiff and approved by the Master. Subsequently on the 24th day of January, 1920, a further motion was made to dissolve said restraining order and upon hearing said motion, it was ordered in accordance with the practice of this court

thereof that the restraining order heretofore made by this court on December 8, 1919, should be kept in force and effect and that plaintiff should give as additional security a bond in the sum of \$10,000 conditioned that if the court should determine the restraining order was wrongfully issued or made or that the conditions of said restraining order was erroneous, the plaintiff would answer, make good and pay to the defendants any and all damages which may be suffered by said defendants or either of them. At the same time it was ordered, as an alternative, in accordance with the practice of this court and by the practice established by the Circuit Court of Appeals for the Sixth Circuit, in Toledo Plate and Window Glass Co. vs. Kawneer Manufacturing Co., 262 Fed. 510, that if said defendants would give a bond payable to the plaintiff in the sum of \$30,000 conditioned to pay all profits that might accrue to plaintiff or all damages that might be sustained by the plaintiff by reason of its being determined that said patent owned by the plaintiff was infringed by the defendants, and then and in that event the restraining order theretofore issued should be dissolved and no further restraining order should be issued for the time being. As will hereafter appear the astute manager of said defendants declined to give said bond last mentioned and the plaintiff having given a bond in the said sum of \$10,000 as aforesaid, the said restraining order was continued in full force and effect and still continues in full force and effect and undissolved.

I have proceeded to hear the evidence produced on behalf of the parties hereto respectively, evidence

being taken pursuant to orders made herein, at my office in Los Angeles, at San Francisco, California, at Madison, at Milwaukee, in the State of Wisconsin, at Chicago, in the State of Illinois, and at Philadelphia, in the State of Pennsylvania, all of which evidence is reported and returned herewith in depositions and testimony taken in open court, the latter in three volumes, which is all the evidence taken in said cause, and which evidence with all exhibits accompanying the same I return herewith.

From said evidence it appears as follows:

The mechanism controlled by the plaintiff and described in the patent aforesaid is for an invention relating to an apparatus used for drawing water from driven or artesian wells and particularly for the means of adjusting the pump therein.

The structure is a centrifugal pump construction which is designed and adapted to be inserted in a deep well casing of small diameter and to be freely suspended as a unit from the pump head at the surface of the ground and to be manipulated therefrom. The patent provides for maintaining and protecting the pump and the shaft in a closed casing which is to be operated from the top. The adjustment and lubrication of the well mechanism are specially provided for and in addition thereto it provides for the protection of the bearings and shafting after the pump has been lowered into a well hold and without the necessity of removal therefrom. The closure of the pump and its lubrication are particular features of the structure and the methods used by Layne are carefully to be considered. It provides for the use of a shaft wherein were intermediate bearings, lubri-

cated from top to bottom by gravity and protected from water and sand and other detritus in the well, by being enclosed in a casing which excluded both sand and water and other detritus from said bearings and shaft. In actual operation to secure a perfect alignment of the shaft a system of wedges and spiders held the well mechanism in position when adjusted. The suspension also of the well mechanism from the top kept the shafting in alignment, and there was added stiffness given to the inward drive shaft by the downward thrust and its weight. This downward thrust helped to effect the closure of the lower bearing against the entrance of sand and water. The specifications of the patent showed that Layne relied upon stuffing-boxes also at the top and bottom of the shaft to effect a closure and to prevent entrance of water and sand to the detriment of the shaft and bearings.

Layne in his invention has met the difficulties that were interposed up to that time. As we have said before, he did this by the use of a jointed shaft with intermediate bearings, lubricated from the top to the bottom by gravity, and protected from the water and sand of the well by being enclosed in a casing which excluded both sand and water from the bearings and shaft. He accomplished its adjustment to a vertical position in the well hold by suspending the shaft pump and casing from the top of the well and by a system of wedges holding the well mechanism in position when adjusted. The suspending of the well mechanism from the top also enabled Layne to keep the shaft in alignment through the added stiffness given by the downward thrust and the weight of the

pump and shaft. This downward thrust also helped to effect the closure of the lower bearing against the entrance of sand and water. There was also provided and relied upon stuffing-boxes at the top and bottom of the shaft to effect the closure and prevent the entrance of water and sand to the detriment of the shaft and bearings. We have then a complete arrangement of a closed shaft, the alignment of the shaft in the well casing, a provision for lubrication for the shaft and bearings and the protection of the shaft and bearings from water and sand.

The claims of the patent which are in *controversy* in this case or claimed as infringed are, Claims 9 13 and 20 above mentioned.

Validity has been given to these claims in the cases of El Campo Machine Co. vs. Layne, 195 Fed. 83, Van Ness vs. Layne, 213 Fed. 804, and in the recent case of Getty vs. Layne, 262 Fed. 141, all in the Circuit Court of Appeals in the Fifth Circuit, and also in the case of the United Well Works vs. Layne, — Fed. —, in the Eighth Circuit, a memoranda decision.

In the Getty case, *supra*, the enclosed line shaft was defined as having the three functions, (1) aiding of the alignment of the shaft in the well casing, (2) providing for lubrication of the shaft and bearings, and (3), protecting the shaft and bearings from water and sand.

In this Getty case also the question of adjustment entered into the discussion of the case and the enclosed shaft of Claim 20 was restricted by referring it to the character of closed line shaft claim described in the specification of the patent.

In the patent the shaft is described as a jointed shaft, with top, intermediate, and lower bearings, means of adjustment and fixation, means for lubrication, means for alignment in the well, and means for preventing water and sand from reaching the shaft and bearings. It appears therefore that there is a complete closure in the Layne patent.

It is not contended that the Layne patent is a pioneer patent.

While it is not a pioneer patent, yet the broad language of the claims is unlimited and it is entitled to a wide range of equivalents. This disposes of the idea, that the actual construction of the mechanism does not in all respects follow the specifications of the patent, and that it is necessary to enlarge the range of equivalents in order to enlarge the idea of the patent. It is not necessary to enlarge the patent upon the idea that it is a pioneer patent. It is an advance over anything that was previously constructed or patented and in itself shows novelty, especially in respect to alignment, lubrication and closure as we shall hereafter point out.

Apparently the defendant's pump also accomplished its alignment by suspension of the mechanism from the top of the well; but it is also claimed that the shaft casing received its support by resting on the top of the pump bowls. There is evidence to the effect that because of this tension of the shaft casing on the top of the well exceeded but a few pounds.

When this case was first commenced and the

injunction granted herein there is little doubt that there was an infringement by the defendants of the respective methods used by Layne for alignment, lubrication and closure.

In addition to the defenses made in the El Campo, Van Ness, Getty and United Well Works cases, *supra*, either as to the validity of the Layne patent or the infringement by the defendants, the defendants herein have set up and alleged that the Layne patent was invalid because Mahlon E. Layne was not the true or original or first inventor of said well mechanism patented under said Letters Patent, and also alleged that prior to the alleged invention of Mahlon E. Layne, and prior to his filing application for patent in the Patent Office, the said Claims 9, 13 and 20 of the alleged patent were in fact invented by Byron Jackson and Frank Jackson, the owner and employee respectively, of the Byron Jackson Machine Works of San Francisco, Cal., who were using reasonable diligence in adapting and perfecting said invention and that while the application for said Letters Patent of Mahlon E. Layne was pending, said Mahlon E. Layne so limited and confined the claims of said application that he was not entitled to seek for or obtain a construction for such claims sufficiently broad to cover the construction used by defendants.

There was also set up and alleged that there was prior use of said claims and publication thereof by letters patent of the United States mentioned in letters patent No. 522,518 granted to S. M. Eisler July 3, 1894; No. 735,692 granted to J. W. Alvord

August 11, 1903, and 705,844 granted to E. M. Ivens July 29, 1902, and by certain machines manufactured and sold by Byron Jackson Machine Works of San Francisco, Cal., at different dates in the years 1901 and 1904.

It is also alleged by the defendants that Mahlon E. Layne surreptitiously or unjustly obtained said letters patent for that the machine therein mentioned was in fact invented by Frank Jackson and Byron Jackson, aforesaid, and the claims aforesaid mentioned were not new when produced by said Mahlon E. Layne, and that said claims were patented previously by divers and sundry persons mentioned in the answer of defendants and particularly by Crannell No. 425,933, April 15, 1890, Cavellero No. 524,666, August 14, 1894, and others, and that the alleged and pretended inventions as claimed in letters patent No. 821,653 and especially claims 9, 13 and 20 thereof were in public use and sold or constructed and successfully operated in the United States of America prior to the pretended application of said Layne for said letters patent, by Byron Jackson, Frank Jackson, and the Byron Jackson Machine Works of San Francisco. As to this latter phase of the case, reference is especially had to the amended answer filed by the defendants by leave of court March 15, 1920, wherein were had both the defenses of prior invention and prior use and are distinctly set forth as grounds for the invalidity of said patent.

At the threshold of this investigation we are confronted with the assertion or contention of the plain-

tiff that all the questions presented to and decided by the Circuit Court of Appeals of the Fifth Circuit in the foregoing cases of El Campo, Van Ness and Getty vs. Layne, and in the Eighth Circuit in the foregoing case of United Well Works, *supra*, were determinative of the questions therein presented and therefore are conclusive as to the validity of said letters patent issued to Mahlon E. Layne except as attacked by the alleged prior invention and prior use of the pump mechanism by Byron Jackson and Frank Jackson or the Byron Jackson Machine Works. It is contended on behalf of the plaintiff that the decisions of the Circuit Court of Appeals are binding upon this District Court in its determination of this case in the absence of any decision by the Circuit Court of Appeals of the Ninth Circuit in reference thereto.

It is urged by counsel for plaintiff that we should adopt the rule laid down in Schmeiser Manufacturing Company vs. Lilly, 189 Fed. 631, that where the validity of the patent has been before the Circuit Court of other districts and in both cases was contested, this court will not examine anew the question which has been thus adjudicated, for it is said, in patent cases conclusive effect is accorded by each of the Circuit Courts of the United States to a prior judgment of any one of them, whatever the patent, the question, and the evidence are the same in both cases. See, also, Office Spec. Mfg. Co. vs. Winternight, 67 Fed. 928, and Wanamaker vs. Enterprise Manufacturing Company, 53 Fed. 791.

But this is a question of comity only and we

think that the plaintiff overstates somewhat the claims of comity. For the reasons given we prefer the language of Mr. Justice Brown speaking for the Supreme Court in the case of *Mast Food Company vs. Stover Manufacturing Company*, 177 United States, 485, which reads:

Comity is not a rule of law, but one of practice, convenience and expediency. It is something more than mere courtesy, which implies only deference to the opinion of others since it has a substantial value in securing uniformity of decision, and discouraging repeated litigation of the same question. But its obligation is not imperative. If it were, the indiscreet action of one court might become a precedent, increasing the weight with each successive adjudication, until the whole country was tied down to an unsound principle. Comity persuades; but it does not command. It declares not how a case shall be decided, but how it may with propriety be decided. It recognizes the fact that the primary duty of every Court is to dispose of cases according to the law and the facts; in a word, to decide them right. In doing so the Judge is bound to determine them according to his own convictions. If he be clear in those convictions, he should follow them. It is only in cases where, in his own mind, there may be a doubt as to the soundness of his views that comity comes in play and suggests a uniformity of ruling to avoid confusion, until a higher court has settled the law. It demands of no one that he shall abdicate his individual judgment, but only that deference shall be paid to the judgments

of other co-ordinate tribunals. Clearly it applies only to questions which have been actually decided, and which arose under the same facts.

The obligation to follow the decisions of other courts in patent cases of course increases in proportion to the number of courts which have passed upon the question, and the concordance of opinion may have been so general as to become a controlling authority. So, too, if a prior adjudication has followed a final hearing upon pleadings and proofs, especially after a protracted litigation, greater weight should be given to it than if it were made upon a motion for a preliminary injunction. These are substantially the views embodied in a number of well-considered cases in the Circuit Courts of Appeals. *Macbeth vs. Gillinder*, 54 Fed. Rep. 169; *Electric Manufacturing Company vs. Edison Electric Light Company*, 61 Fed. Rep. 834; S. C., 18 U. S. App. 637; *Edison Electric Light Company vs. Beacon Vacuum Pump and Electric Company*, 54 Fed. Rep. 678, and cases cited.

I am influenced in the decision which I have come to by the following citations: In *Vacuum Cleaner Company vs. Thompson Manufacturing Company*, 258 Fed. 239; Judge Wade writing the opinion of the Court, held:

"A Federal District Court will follow the ruling of the Circuit Court of Appeals of another circuit where the matter has not already been before the Circuit Court of Appeals of the circuit in which the lower court is sitting."

The Court said:

"Counsel for defendants state the issue herein thus: Does the prior art disclose a so-called suction or vacuum having an inlet head characterized by a narrow inlet slot so arranged that its boundaries are adapted to be brought into sealing contact with the surface to be cleaned? Answering this question in the affirmative, counsel rely principally upon three patents (naming them). This case might well be disposed of upon the following adjudications: (Citing three or four.)

Not any of these cases constitute an adjudication as against this defendant; but, as a rule, a District Court will follow the ruling of the Circuit Court of Appeals of another circuit where the matter has not already been before the Circuit Court of Appeals of the Circuit in which the trial court is sitting."

It was said by Judge Dallas in the case of *Office Specialty Manufacturing Company vs. Woodernight*, 67 Fed. 928:

"This court will not examine anew the question which has thus been adjudicated, but will accept the decisions referred to as determinative of the effect of the evidence upon which they were based. (Citing *Wanamaker vs. Enterprise Manufacturing Company*, 53 Fed. 791.) If the rule here adverted to were one of comity merely, it would, I think, be impossible to justify its derogation from the right of suitors to the veritable judgment of the tribunal to which any particular case is confided for decision. Upon general questions of law the views of courts of co-ordinate jurisdiction are always

regarded with respectful consideration, but not as controlling. In patent cases, however, conclusive effect is accorded by each of the circuit courts whenever the patent, the question and the evidence are the same in both suits, not on the ground of comity alone, but with the practical and salutary object of avoiding repeated litigation and conflicting decrees."

And in the case of National Cash Register Company, 53 Fed. 370, the Court said:

"The Court whose decree is the subject of this appeal expressed no independent opinion, but merely followed the decision of the Circuit Court for the District of Massachusetts in a suit in which the same claim had been in controversy. (National Cash Register Company vs. Boston Indicator & Recorder Company, 45 Fed. 481-5.) The course pursued in that regard was in conformity with the rule well established in this circuit to follow, unless under extraordinary circumstances, a prior judgment of another of the circuit courts of the United States, whenever the patent, the question and the evidence are the same in both suits. We do not question the propriety of this practice as it has heretofore prevailed, but it cannot be extended to this court."

An exhaustive examination of the record herein and the decisions of the Circuit Court of Appeals of the Fifth and Eighth Circuits upon the questions therein presented respectively are convincing that those decisions are binding upon this court in the absence of a decision of the Circuit Court of Ap-

peals of the Ninth Circuit, or until it shall hold otherwise;

Therefore, we have concluded that the Layne patent is in all respects valid in favor of the plaintiff, except as we should now determine that it is invalid by reason of the prior invention and prior use of said pump mechanism by Byron Jackson, Frank Jackson and the Byron Jackson Machine Works, as urged by the defendants, all other questions as to the validity of said patent having been previously asserted and determined in the several cases above mentioned which were determined by the Circuit Courts of Appeals for the Fifth Circuit and Eighth Circuit.

Again, carefully examining the evidence bearing upon the question of the validity of the patent in question, we have come to the conclusion and so find that the Layne patent is in all respects valid, as the evidence offered in the three cases before the Circuit Court of Appeals of the Fifth Circuit and the one case that was presented in the Eighth Circuit discloses. However, we now must approach the case from the view of the record here presented, wherein it was claimed that the patent was invalid by reason of the prior invention and prior use of said pump mechanism by Byron Jackson, Frank Jackson, and the Byron Jackson Machine Works as urged by the defendants. So far as we have been able to examine the records in the cases presented in the Circuit Court in the Fifth Circuit and in the Eighth Circuit in what may be known as the El Campo, Van Ness and Getty cases in the Fifth

Circuit and the United Well Works case in the Eighth Circuit, all other questions as to the validity of said patent were previously asserted and determined in the several cases above mentioned by said Circuit Court of Appeals.

The question presented as to the defense of the prior invention and prior use by Byron Jackson and Frank Jackson and the Byron Jackson Machine Works of the mechanism involved herein is first presented in this case and it becomes necessary to determine the validity of that defense. The defense herein proposed involves either that the Byron Jackson pump or the mechanism there involved was fully completed and installed, as well as described in drawings prepared by Byron Jackson prior to the application of Mahlon E. Layne for patent April 28, 1903, because there never was any application made for any patent upon the Byron Jackson pump. Byron Jackson depended solely for his claim of invention on drawings and designs which he made of the pump and subsequently the completed manufactured structure. At the time that Layne applied for the patent in question there was no complete conception of the Jackson structure. The evidence shows beyond question that it was not until late in the year 1903, and not earlier than October of that year that Byron Jackson was still working upon the device in question and had not satisfactorily completed the same until after that time. Plans had been drawn for a deep well pump mechanism consisting of a closed line shaft as early as March 5, 1902; but Byron Jackson

shows by letters which he wrote during the year 1903 that he had not completed the structure and it was not until after April 28, 1903, that a general drawing was made of the Jackson mechanism for the purpose of installation by Byron Jackson for the Pabst Brewing Company for the purpose of showing the shaft, shaft casing, discharge casing, pump bowls and bearings for the shafts, but in October, 1903, Jackson sent his workmen for the first time to Milwaukee, Wis., for the purpose of installing such a plant as he had designed and the structure of which was then practically completed for the Pabst Brewing Company.

The question presented by this record as to the defense of the alleged prior invention and prior use by Byron Jackson and Frank Jackson and the Byron Jackson Machine Works of the mechanism involved is the first proposition that must be determined in this case.

The law is well settled that the date of the patent of an invention is at least as early as the date of the application provided it sufficiently describes the invention to enable those skilled in the art to understand it. "Patented inventions always date at least as early as the dates of the execution of the original applications therefor, provided the original applications exhibit the inventions with the above mentioned extent of sufficiency." Walker on Patents, Fourth Ed., sec. 70.

We have therefore, in this Layne case a subsequently patented invention as a completed invention April 28, 1903; it is an invention which is

perfected and adapted to use, or which is expressed, constructively reduced to practice. The Byron Jackson conception was not reduced to practical use before that time, and Byron Jackson did not seek to secure any patent thereon. As early as May 6, 1901, he erected a sludge pump with a separate discharge pipe and shaft casing with intermediate bearings and erected it in a well of a hotel in San Francisco. A drawing of this was made, but the description of it is so vague and having been destroyed by the San Francisco earthquake, the pump itself is not in existence; the testimony is not clear as to its absolute construction or that others were instructed in its use or how successful was its operation. It is not repeated and no application was made for a patent upon it.

On March 5, 1902, a drawing was made by Byron Jackson of a pump with an inner shaft casing surrounded by a concentric discharge casing, but at that time Byron Jackson did not construct any pump according to said drawings. Subsequently on April 20, Byron Jackson while working upon the drawings of said pump agreed to make a pump for the purpose for which it was intended, for the Pabst Brewing Company of Milwaukee, but it was not completed until subsequent to the 1st of October, 1903. It was installed and furnished under the Pabst contract, and in running order January 12, 1904. There was no patent applied for prior to its installation on January 1, 1904, it had not been reduced to practice.

Byron Jackson was not therefore entitled to

protection as an inventor, as he had not embodied the idea into a practical machine and reduced it to practical use and I find he did not anticipate the Layne patent applied for and allowed as aforesaid. The Jackson conception not having matured and ripened into an allowable patent and no completed machine being shown of the Byron Jackson conception nor having been put into practice prior to the Layne application, it must be held that Jackson's conception did not in anywise invalidate the Layne patent. *United States Metallic Packing Company vs. Hewitt Company*, 236 Fed. 739.

The Alvord defense based upon the patents issued to Alvord in 1902 was also before the Circuit Court of Appeals in the *El Campo*, *Van Ness* and *Getty* cases above mentioned, and has been interpreted, construed and passed upon; and it has been held that the Alvord defense is not an anticipation of the Layne Patent. In his patents were all that he had in the line of invention, he had other ideas, but they had never reached the state of completed inventions. The two sketches as made by Alvord and testified to in the *Whittesley* deposition were never completed inventions. Alvord never devised an enclosed tube for his proposed shafting. Alvord never had any idea of alignment, lubrication or closure against sand, water and detritus as is exhibited in the Layne patent.

We are confronted of all that remains, therefore, with the questions whether the methods used by Layne of alignment, lubrication and closure have been infringed by the defendants.

It must be acknowledged that the feature of the Layne patent is the combination of a well casing, a rotary pump therein and a shaft for the pump entirely closed off from the water of the well. We have already given validity to this claim and it should be again defined as a closed shaft having three functions of (1) aiding the alignment of the shaft in the well casing; (2) providing for lubrication for the shaft and bearings; (3) and protecting the shaft and bearings from water and sand. It is the infringement of these in combination that is fatal to the defendants.

The defendants have infringed upon the enclosed line shaft of plaintiff's patent for there is in the defendants' structure a jointed shaft with top, intermediate and lower bearings, means of adjustment and fixation, means for lubrication and means for alignment in the well.

In the defendant's structure I find as follows: The pump column or water discharge pipe is screwed into the pump neck and is cut into ten-foot lengths; about five inches of the column couplings also act as the spider guide. The protective tubing that surrounds the shaft is cut into five foot lengths with a bronze bearing every five feet. The drive shaft is cut in ten-foot lengths united by threaded couplings. At its lower end this drive shaft is coupled to a stub shaft which is connected to the pump runner. A five-inch long sleeve bearing surrounds the sub shaft, from a point above the pump neck down into the pump neck where such sleeve bearing screws into the pump neck. To the outside

of this bearing and above the pump neck the lower end of the protective tubing is screwed, making a tight joint. The working clearance between the inner or bearing surface of this sleeve bearing and the periphery of the stub shaft is a working fit,—the clearance being but a $1/64$ of an inch. Below this sleeve bearing and within the pump neck is a piston ring provided to further prevent passage of water or sand upward, or the passage of oil downward, except through the hollow runner shaft. The sleeve which surrounds the stub shaft below the five-inch sleeve bearing, before mentioned, and which carries the piston ring is held in contact with the last named sleeve bearing by a spring which exerts five or six pounds pressure to hold against the lower end of the five-inch sleeve bearing. From fifty to one hundred pounds tension was applied to the shaft enclosing tubing. Practically the entire weight of the pumps bowls is carried by the discharge pipe, depending from the pump head. There is no weight carried on the protecting tubing around the shaft.

There is no vent between the upper portion of the enclosing casing and the lower portion; no vent in the enclosing casing; and therefore there is no infringement of Claim 13.

Spiders are screwed on to the discharge pipe at each ten-foot section, which spiders are bored about $1/32$ of an inch larger than the diameter of the protecting tube. These bearings line up the shaft and keep the alignment of the revolving parts. The weight of the shaft is carried on a special thrust

bearing put in the pump head. The pump is suspended at the top of the well and the entire weight of all the mechanism is supported there.

As for lubrication, the oil is put in at the top and gravitates down inside the shaft casing through the sleeve bearings to the bottom of said casing where part of it is diverted into an oil duct leading to the inside of the hollow runner shaft and part of said oil wastes into the water at that point. The diversion of said oil into the oil duct is accomplished by means of a piston ring designed to be held in place by a light spring with five or six pounds pressure. There is some irregularity of motion in the rotation of the shaft which may lift the ring out of place and if the oil has become thick and sticky, the ring may become stuck above its seat and the oil waste out more rapidly at that point. The oil duct is bored about $\frac{1}{4}$ of an inch in diameter through the circumference of the solid stub shaft to the center where it turns down and passes out at the lower end into a hollow runner shaft. The hollow runner shaft is screwed on to the stub shaft. It is held in place at the bottom by a stationary stub shaft which is thoroughly lubricated by the oil coming down through the hollow runner shaft.

After lubricating the stub shaft, the oil works up through a similar arrangement to that above described, of spring and piston ring into the water of the well. At first felt was used in connection with the piston rings to keep out the coarse sand, but water went right through. It was not water-tight. Later the felt was abandoned.

About one-half pint of oil is used for a ten-hour run.

There are no thrust bearings used to help the closure at the bottom of the shaft casing or anywhere within said casing. Nor is there any adjustable stuffing box as in the Layne patent.

The defendants' structure differs from the Layne patent on account of the defendants' new means and system for directing and applying the oil and discharging same into the water after it has lubricated the bearings.

For this reason defendants do not infringe the plaintiff's claim 13 here involved, but as I have heretofore found, claim 20 is infringed, if not claim 9 also. See Getty case, *supra*.

This was the condition and structure of the defendants at the time suit was brought and up to January 23, 1920.

SUPPLEMENTAL AND CHANGED CONSTRUCTION OF DEFENDANTS' DEVICE AND REPORT UPON CONTEMPT PROCEEDINGS.

At this time defendants adopted different features as to pump mechanism as to lubrication and for closure. They abandoned the combination above mentioned which was apparent in the Layne structure.

There cannot be said to be any difference in the method of alignment used by the defendants in their structure and the method used by Layne. The mechanism in both cases is suspended from the top of the well, but in the defendants' pump by reason of a slight support of the enclosing tubing on the

pump neck there is little tension imposed upon by the enclosing tubing.

The alignment is kept by the use of spiders in the defendants' pump and it is also adopted at intervals in the Layne pump. The use of spiders was a well-known mechanism and it cannot be held that the defendants have necessarily adopted that part of the Layne device for the purpose of creating an alignment and there is no new discovery on their part by the adoption thereof.

With reference to the method of lubrication, however, there was a considerable difference subsequent to January 23d, 1920, between the methods employed by the defendants and by Layne. Layne's method of lubrication was to put the oil in at the top and permit it to descend to each of the shaft bearings and remain stagnant in the shaft casing until ejected from the top, after it had become spent, by air pressure through an air vent. When it was ejected, it was replaced by clean oil from the top again. The oil was confined at the bottom of the tubing by use of a packing or stuffing box.

The defendants, however, after January 23d, 1920, adopted a circulatory system of lubrication. The oil was introduced from the top, passed through a short tube connected to the casing and descended along the casing to the shaft bearings by gravity. Before reaching the extreme lower end of the protecting casing it passed through between a long eight-inch sleeve bearing (which surrounds the upper end of the stub and which extends down into the pump neck), and the outside of the stub shaft. This long sleeve bearing was bored $1/64$ of an inch

larger than the shaft and from the lower end of the long sleeve bearing the oil passed into a duct in the shaft where there was a passageway and thence out through the bottom of the stub shaft where the unconsumed oil mingled with the waters of the well. This method was different from anything that had ever before been constructed and provided a means of lubrication from the top to the bottom, prevented stagnation in the oil and made it absolutely circulatory at all times that the mechanism was in operation.

The defendants' mechanism is free from any closure device either against the flow of oil outward or the flow of water inward, except the long sleeve bearing. Necessarily the downward pressure of the column balances the upward pressure of the water column. There are no packing boxes in the defendants' structure as in the Layne invention to effect closure, and it is absolutely necessary that there should be nothing to prevent the exit of oil which is a necessary feature of the circulatory system. There is no downward thrust in the defendants' structure due to the weight of the apparatus as the means of closure. One-half pint of oil is plenty for a ten hours' run.

It would appear therefore that defendants accomplished lubrication and closure by means so fundamentally different from Layne's closure in his patent that they cannot be said to be mere mechanical equivalents. The fact that the defendants' structure either in lubrication or closure are not as complete in effect as that of Layne is an important factor but the structures differ so radically that it can-

not be said to be a mere difference in degree.

Layne's closure is effected by physical obstructions such as packing boxes and thrust bearings and by pressure of the oil column while the defendants' closure is effected by the column of water outside the shaft casing against the pressure of the oil inside the casing without the use of physical obstruction. The difference is one of novelty on the part of the defendants and not adopted merely to avoid infringement.

The defendants' structure is suspended from the top of the well but it does not use thrust bearings to help close the bottom of the shaft casing. The differences between the plaintiff's structure and the defendants' structure are with reference to the lubrication and closure and are so important that they should not be held to be mechanical equivalents and not to infringe the enclosed line shaft lubrication enclosure of the Layne patent.

In these features especially do I find that the defendants do not infringe the plaintiff's patent.

On the 27th of April, 1920, an order was entered herein directing that the above-named defendants, and each of them, show cause before this Court why they, and each of them should not *adjudged* in contempt of court for violating the restraining order or injunction heretofore issued in the above-entitled cause. It came on for hearing in open court on Monday, the tenth day of May, 1920, and by stipulation, consent and agreement of counsel for plaintiff and defendants it was ordered that said order to show cause, and the plaintiff's motion accompanying the same, should be referred to the undersigned

as Special Master to hear all the evidence and proof and decide all the issues between the parties upon said order and motion and upon said charge of contempt of court for violating said restraining order or injunction and to make his report to this court separately stating his findings of law, and fact, together with all the evidence introduced before him, which evidence should become a part of said record.

Accordingly being attended by counsel for the respective parties, having heard the evidence produced on their behalf respectively, I find that since the granting of the said restraining order, and on or about the 14th day of April, 1920, that said American Well and Prospecting Company assembled a pump of said American Well and Prospecting Company's at the ranch of W. E. Hart, near Puente, Los Angeles County, California, as described in the affidavits of Mahlon E. Layne and O. P. Woodburn filed in said case, which pump was erected and installed upon the lines of pumps constructed by said American Well and Prospecting Company subsequent to January 23, 1920, last hereinabove described.

I find that it is true that no water, or sand or detritus was in the enclosing casing or in the bearings and that there was no sand or detritus in the inside of said enclosing casing above the pump neck; that upon the erection of said pump there was a large amount of grease inserted in said casing but that it had become worn and was escaping from just below the long brass sleeve which is located in the pump neck. That said long sleeve bearing in said pump is made of brass and was eight inches in

length, but said long sleeve bearing does not effect the entire closing of the pump shaft with the enclosing case from water or sand to detritus from the well, from the discharge pipe and from the pump proper in combination with a lubricant as contained therein or in the same manner set forth in said Layne patent, and does not in fact effect any closure of said pump as it is open and the oil and lubricant are free to move therein without obstruction.

I, therefore, find that said defendants have not constructed said pump at the Hart ranch, or otherwise or at any place, since January 23, 1920, in violation of said restraining order or infringement of the said Layne patent.

I further find that said defendants before abandoning the construction of said original device, as hereinbefore set forth, and before constructing the pump on the Hart ranch, which it was alleged was done in violation of the injunction herein, submitted said device by them constructed since January 23d, 1920, to their attorneys, learned in the law and familiar with such matters, and were advised by them that said device was not in infringement of said patent and not in violation of said injunction; that they did not violate said injunction wilfully or with any attempt to usurp the prerogatives of this court.

As a conclusion therefrom, I find that an order should be made herein discharging said order to show cause and absolving said defendant from violation of said restraining order without costs to either party.

As conclusions from the foregoing, I find that a

decree should be entered herein finding that the defendants prior to January 23, 1920, infringed said patent No. 821,653, and should be restrained from further infringing the same, and that they should account to the plaintiff for the profits which they may have received from that infringement and for such damages as the plaintiff may have suffered by reason thereon and that plaintiff should have recovery of his costs herein. On January 23d, 1920, a motion was made by the defendants for leave to file in said suit a counter-claim against the plaintiff to recover damages against it for the alleged wrongful suing out and prosecuting said restraining order, entered herein as aforesaid. Said motion was then taken under advisement and is now determined. In view of the evidence and what has been found herein as aforesaid, said motion for leave to file said counter-claim is denied and said counter-claim is dismissed for want of equity.

The foregoing completes the findings of fact and of law, both upon the original reference and the order to show cause why the defendants should not be punished for contempt. Appropriate orders should be made in reference to both divisions of this report.

Respectfully submitted,

LYNN HELM,
Special Master.

Dated July 13, 1920.

[Endorsed]: No. E-42. In the United States District Court, Southern District of California, Southern Division. Layne & Bowler Corporation, Plaintiff, vs. American Well & Prospecting Co.,

Isaac N. Johnston and Frank R. Galbreath, known as King Meh. & Mfg. Co., Defendants. Master's Report. Filed Jul. 14, 1920. Chas. N. Williams, Clerk. By R. S. Zimmerman, Deputy Clerk. Lynn Helm, E. S. Williams, 918 Title Insurance Building, Los Angeles, Cal., Attorneys for ———.

I, Chas. N. Williams, Clerk, United States District Court, for the Southern District of California, do hereby certify the foregoing to be a full, true and correct copy of the original Master's Report filed in my office July 14th, 1920, in the cause entitled: Layne & Bowler Corporation, Plaintiff, vs. American Well & Prospecting Co. et al., Defendants, No. E-42—Equity, Southern Division, as the same remains on file therein.

ATTEST my hand and the seal of said District Court, this 3d day of September, A. D. 1920.

[Seal]

CHAS. N. WILLIAMS,

Clerk.

By P. W. Kerr,

Deputy Clerk.

[Endorsed]: No. E-42—Equity. United States District Court, Southern District of California, Southern Division. Layne & Bowler Corporation, Plaintiff, vs. American Well & Prospecting Company et al., Defendants. Certified Copy Master's Report.

No. 485. U. S. Dist. Court, Nor. Dist. Calif. Deft. Exhibit "S." Filed Sept. 7, 1920. Maling, Clerk.

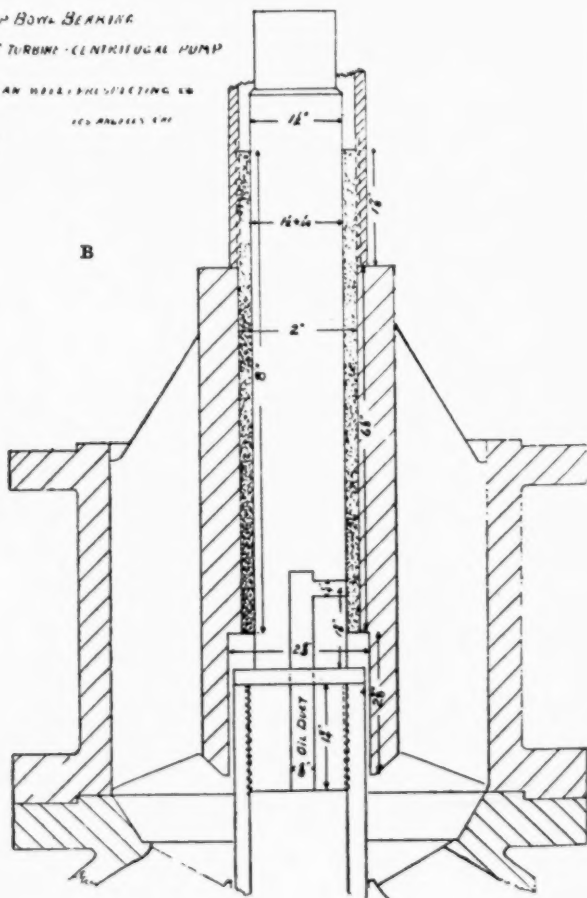
No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monckton, Clerk.

1104 Western Well Works, Inc., et al.

Defendants' Exhibit "T" for Identification.

TOP BODY BEARING
JOHNSTON 10" TURBINE - CENTRIFUGAL PUMP
AMERICAN HOSE & SHEET METAL CO.
105 MADISON ST.
JAN 24/25

B



[Endorsed]: No. 485. U. S. Dist. Court, Nor. Dist., Calif. Deft. Exhibit "T" for Identification. Filed Sept. 7, 1920. Maling, Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monekton, Clerk.

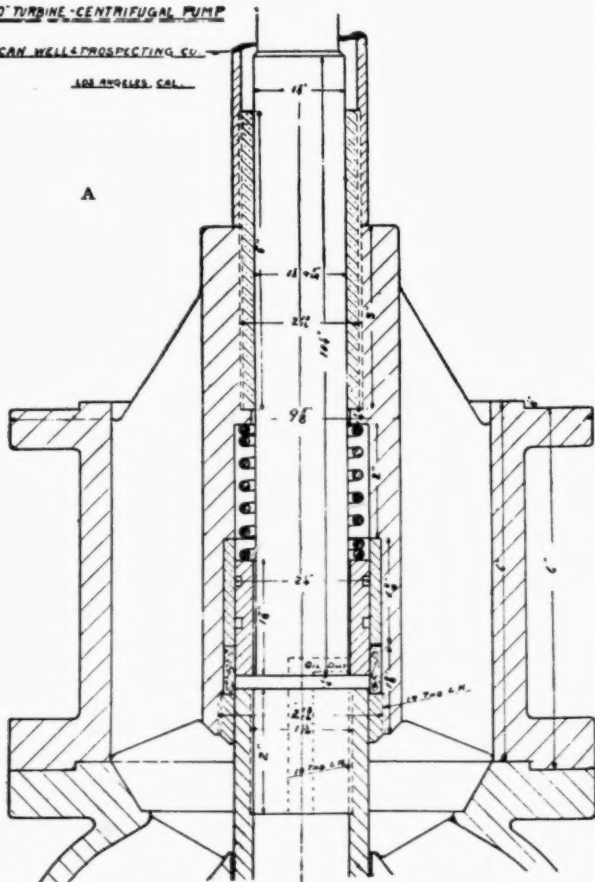
Defendants' Exhibit "U" for Identification.

JOHNSTON 10" TURBINE-CENTRIFUGAL PUMP

AMERICAN WELL & PROSPECTING CO.

LOS ANGELES, CAL.

A



[Endorsed]: No. 485. U. S. Dist. Court, Nor.
Dist. Calif. Deft. Exhibit "U" for Identification.
Filed Sept. 7, 1920. Maling, Clerk.

No. 3627. United States Circuit Court of Ap-
peals for the Ninth Circuit. Filed Jan. 6, 1921.
F. D. Monekton, Clerk.

Defendants' Exhibit "W."

[Endorsed]: No. 485—Eq. U. S. Dist. Court, Nor. Dist. Calif. Deft. Exhibit "W." Filed Sept. 7, 1920. W. B. Maling, Clerk. By Lyle S. Morris, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monekton, Clerk.

vs. Layne & Bowler Corporation. 1109

S. M. HALSTEAD.

PUMP MECHANISM.

APPLICATION FILED DEC. 20, 1915.

Patented June 5, 1917.

2 SHEETS—SHEET 1.

1,228,770.

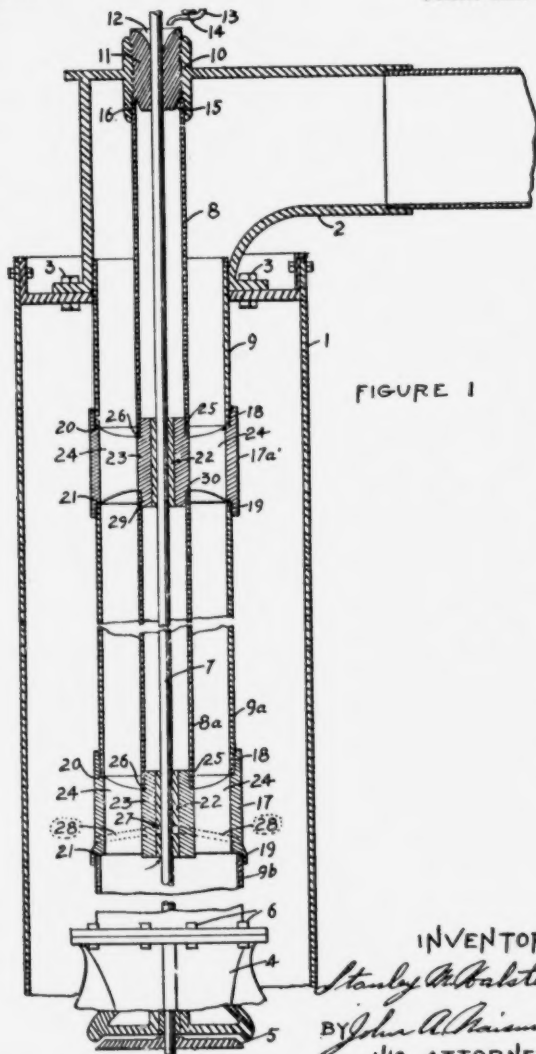


FIGURE 1

INVENTOR

Stanley M. Halstead
BY *John A. Kinsmith*
HIS ATTORNEY

S. M. HALSTEAD.
PUMP MECHANISM.

APPLICATION FILED DEC. 20, 1915.

1,228,770.

Patented June 5, 1917.

2 SHEETS—SHEET 2.

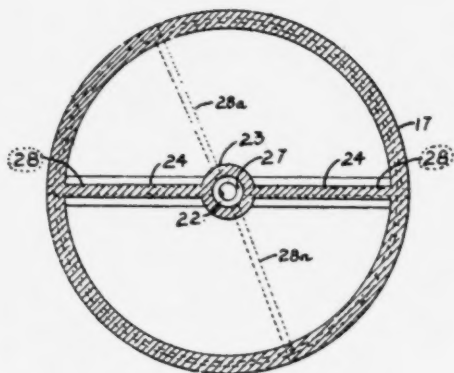


FIGURE 3

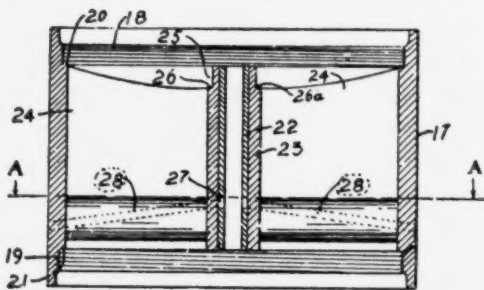


FIGURE 2

INVENTOR

Stanley A. Halstead

BY *John A. Harrison*
HIS ATTORNEY

UNITED STATES PATENT OFFICE.

STANLEY M. HALSTEAD, OF SAN JOSE, CALIFORNIA.

PUMP MECHANISM.

Specification of Letters Patent. Patented June 5, 1917.

1,223,770.

Application filed December 20, 1915. Serial No. 67,797.

all whom it may concern:

Be it known that I, STANLEY M. HALSTEAD, a citizen of the United States, and resident of San Jose, in the county of Santa Clara and State of California, have invented certain new and useful Improvements in Pump Mechanism, of which the following is a specification.

My invention relates to pump mechanism, and more particularly to shaft bearings and parts connected thereto. Two of the greatest difficulties involved in the operation of driving a shaft coupled to a pump submerged in a well, are the keeping of the bearings of said shaft properly lubricated and securing a more perfect and rigid alinement of said shaft. It is the object of this invention to overcome the above named difficulties as well as to simplify the construction and operation of the mechanism and to reduce the installation cost by eliminating certain portions rendered unnecessary by my special form of construction. Other objects are to prolong the life of the mechanism, and to provide a simple and effective cooling system for the same.

These objects are obtained by means of the mechanism described and claimed in this specification and illustrated in the accompanying drawings, in which;—

Figure 1 is a section through a well embodying the preferred form of my invention, parts being broken away.

Fig. 2 is a vertical section through the lower bearing.

Fig. 3 is a sectional view on line A—A of Fig. 2.

Similar characters of reference refer to similar parts throughout the several views.

Referring now more particularly to the drawings, 1 indicates the well casing and 2 the discharge head secured to casing 1 by bolts 3. At 4 is indicated a pump bowl secured to discharge casing 9b by bolts 6, the shaft being secured to pump 5 in bowl 4 and driven in any practical manner. Shaft 7 passes through conduits as 8 and 8a, the discharge casing sections being shown at 9, 9a, etc. The uppermost bearing for shaft 7 is located in the discharge head at 10, part 10 being preferably cast integral with the discharge head 2 and threaded interiorly to receive bearing 11. Bearing 11 is provided with a cup shaped top surface as indicated at 12 into which oil is fed from pipe 13

which is connected to a source of supply not shown, and the amount of oil fed is regulated by a valve 14 or by any other suitable regulator. The lower end of bearing 11 is tapered slightly as shown at 15 in order to receive the upper end of conduit 8, said conduit end slipping into part 10 as shown at 16. At any desirable distance above bowl 4 is positioned bearing 17, the same being interiorly threaded at each end as shown at 18 65 and 19 respectively to receive the threaded ends of discharge pipe sections 9a and 9b respectively, shoulders 20 and 21 being made parallel and true so that when the ends of the discharge casings are fitted to said bearings said casings will be in perfect alinement. At 22 is indicated the babbitted portion of the bearing in the hub 23, said hub 23 being connected to the outer wall of the bearing by webs as 24. The upper edge of hub 75 23 is provided with an annular rabbet as 25, thus forming a seat 26, said rabbet 25 and seat 26 serving to receive one end of a conduit as 8a. At 27 is shown an annular channel cut into, or out of, babbitt 22 and 80 drained by auxiliary conduits 28 passing through webs 24 to the outside and discharging into the well proper.

The above description covers the special construction of the top and bottom bearings. 85 The intermediate bearings are made similar to the bottom bearing last described, with the exception that they are not provided with the annular channel 27 and auxiliary conduits 28 and are provided with a rabbet 90 as 29 and seat 30 on the lower edge of the hub portion as shown in Fig. 1.

When the parts are being prepared for assembling, the ends of the discharge casing sections are manipulated in a lathe in such a manner as to be threaded exactly the same and to have their ends parallel and true, so that when screwed into the threaded portion of the bearing, as section 9a into bearing 17 at 18, the section will come to a true seat 100 as at 20. By bringing each discharge casing section to an exact and true seat as above described, the successive sections must be in alinement, and being screwed in tight must provide a very rigid and secure discharge casing. Since the hub of each bearing member is rigidly connected to the outer portion to which the discharge casing sections are secured it naturally follows that the shaft 105 passing through the successive bearings must

be held in very rigid alinement, and thus one of the principal objects of my invention is secured.

The distance from the bottom bearing 17 to the pump bowl 4 is such as practical conditions in each instalment may dictate, usually a distance corresponding to the standard length of one discharge casing section which forms the support for said bearing. It is the object of the conduits between the successive bearings to assist in the lubrication of said bearings, therefore it is obvious that no conduits are required below the bottom bearing 17 even though said bearing is positioned only half way between the top bearing and the pump bowl, thus eliminating in every case many feet of conduits.

It is not necessary that the conduit seats be square as shown at 26, for since it is desirable to permit the passage of water at these points said seats may be of any convenient form as, for instance, the seat may slope as indicated at 26a. Neither is it necessary that the auxiliary conduits 28 be formed in webs 24 as they may be pipes fitted as shown in dotted lines at 28a in Fig. 3.

When these parts are properly assembled and fitted as hereinbefore described, I am enabled to lubricate all of the bearings with a very small amount of oil in an emulsified form. As hereinbefore described conduits 8 and 8a do not fit tightly into their respective rabbets, but effect a loose sliding fit, thereby permitting a small amount of water to work its way through into the interior of said conduits at these points, the water thus entering being practically free of sand or grit of any kind because of the filtering action of the small space through which it makes its way. This provision for a small quantity of water in the conduits is made so that when oil is fed into the top bearing at 12 and makes its way through said bearing down the shaft to the second bearing 17a, it mixes with the water at said bearing and is emulsified by the rotary action of shaft 7. This emulsion passes down through the successive bearings until the bottom bearing 17 is reached where it passes out through channel 27 and auxiliary conduits 28 into the well proper.

It will be observed that channel 27 is placed a short distance above the lower end of bearing 17. This is done so that the lubricating emulsion will traverse the greater portion of the bearing before draining away. That portion of the bearing below channel 27 will not be lubricated because the upward pressure of the water being raised will tend to force a small amount of water in the direction of the arrow upward through the bearing until the channel 27 is reached where it will be drained away through auxiliary conduits 28. There being

no provision for filtering the water at this point the bearing below channel 27 will of course be worn by attrition, but the major portion of the bearing will remain true and properly perform its function.

It is of course well known that clear water is an excellent lubricant, but the tendency of the shaft to corrode renders its use objectionable when used alone. The use of oil alone is highly objectionable as it contaminates the water to such a degree as to become a nuisance when fed from the top or bottom, and requires a more or less complicated system of pipes when fed directly to each bearing, besides adding considerably to the expense of operating. I obviate these objectionable features by using an oil emulsion as a lubricant as above described, thereby providing a cheap lubricating medium, preventing corrosion of the shaft, not contaminating the water delivered and, on account of the constant flow of water through the bearings, providing an efficient cooling system for said bearings.

It will be readily seen, of course, that since the conduits are connected to the well proper by channel 27 and auxiliary conduits 28 the water in said conduits will be drained to the level of the water in the well when the pump is in operation, and consequently there will always be a movement of the water into said conduits, down the shaft, through the bearings and out through auxiliary conduits 28. The draining of conduits 8, 8a, etc., in this manner also conduces to economy by obviating the necessity of providing a stuffing-box at the top bearing.

It should be understood that while I have specifically described one embodiment of my invention, many changes may be made therein without departing from the spirit and substance of my invention, as for instance, while I have shown and described my invention in use with a vertical rotary pump, it can be used equally as well with a vertical reciprocating pump.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A bearing member adapted to engage a shaft and adapted to slidably engage conduits through which said shaft passes and tapped to receive the threaded ends of discharge casing members.

2. A bearing member adapted to engage a shaft and adapted to loosely engage a conduit through which said shaft passes and tapped to engage the threaded ends of discharge casing sections, there being an annular channel formed in the wearing surface of said bearing member and means for providing open communication between said annular channel and the exterior of said bearing member.

3. A bearing member adapted to engage a shaft, said bearing member being supported by a discharge casing section and supporting a discharge casing section and a conduit through which said shaft passes and provided with means whereby open communication is maintained between said conduit and the exterior of said bearing member.

4. A bearing member comprising a hub adapted to engage a shaft and slidably engage the ends of conduits through which said shaft passes, and an outer member supported by said hub and adapted to engage the ends of discharge casing sections.

5. A mechanism of the character described, comprising a shaft, a pump attached to said shaft and submerged in a well, a pump bowl inclosing said pump, a discharge casing extending from said bowl to the top of the well, and a plurality of bearings for said shaft supported by said discharge casing, the lowermost of said bearings being spaced a distance above said pump bowl, and the successive bearings being connected by tubes in such a manner as to form conduits through which said shaft passes and permit a quantity of water to enter said conduits and traverse said bearings when the pump is in operation.

6. A mechanism of the character described, comprising a pump, a shaft attached

thereto, an upper bearing for said shaft adapted to receive a lubricating fluid, a bottom bearing for said shaft adapted to drain away lubricating fluid from the bearings to the well, and alternate and loosely coupled conduits and bearings through which said shaft passes.

7. In combination with a pump having a shaft attached thereto, an upper bearing adapted to receive a lubricating fluid, means for introducing a predetermined quantity of lubricant into said bearing, a bottom bearing adapted to drain away lubricating fluid from said bearings, and alternate and loosely coupled conduits and bearings through which said shaft passes connecting said upper and bottom bearings.

8. In a pump mechanism for wells, the combination with a pump having a shaft attached thereto and an inclosure therefor, of a discharge casing extending from said inclosure to the top of the well and supporting a bearing for said shaft, said bearing forming the lower discharge end of a series of loosely coupled conduits and bearings through which said shaft passes.

In testimony whereof I have hereunto affixed my signature this 9th day of December, 1915.

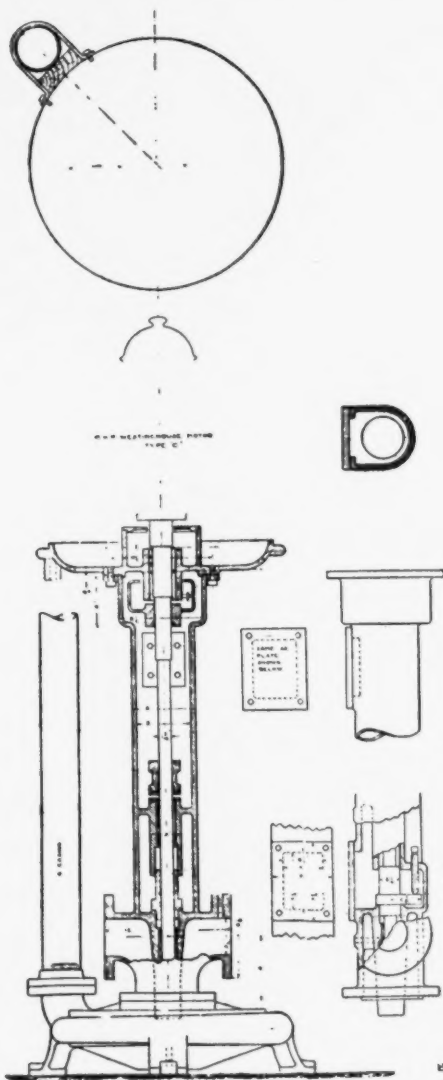
STANLEY M. HALSTEAD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

1114 *Western Well Works, Inc., et al.*

No. 485—Eq.

**Blue-print Attached to Deposition of Franklin A.
Jackson and R. C. Robb.**



3 1/2 INCH CENT PUMP
BYRON JACKSON MACHINE WORKS
DRAWN BY J. C. ROBB
CHECKED BY F. A. JACKSON
DATE 10-10-10

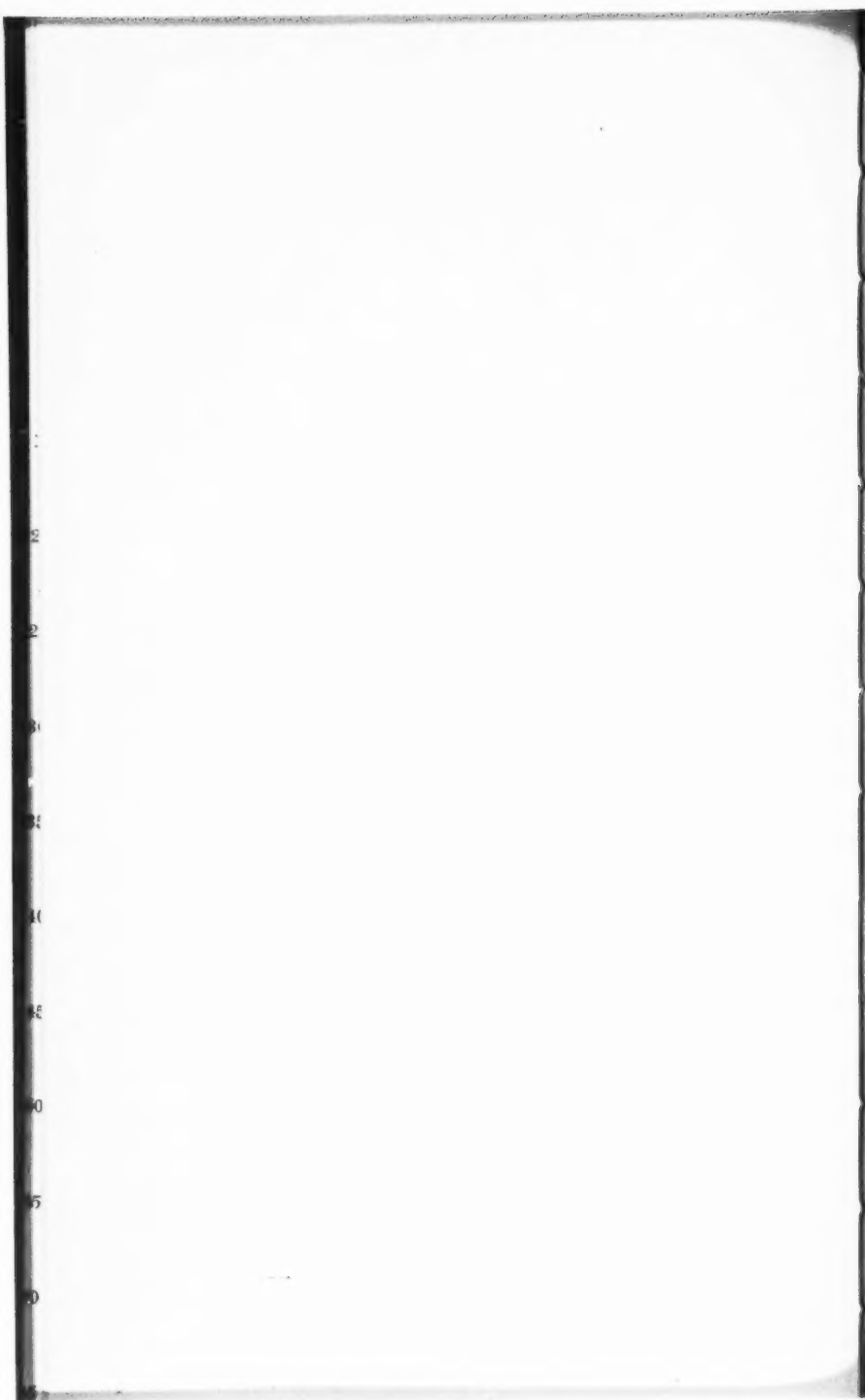
I, Chas. N. Williams, Clerk of the United States District Court for the Southern District of California, do hereby certify the foregoing to be a full, true and correct copy of the Defendants' Exhibit No. 2 in the case entitled Layne & Bowler Corporation, Complainant, versus American Well & Prospecting Co., et al., Defendants, in Equity—No. 42, filed in the office of Lynn Helm, Special Master, on March 1st, 1920, and filed in my office on July 14th, 192 , as the same remains on file and record therein.

[Seal] CHAS. N. WILLIAMS,
Clerk, United States District Court, Southern District of California, Southern Division, this 23d day of August, A. D. 1920. By R. S. Zimmerman.

[Endorsed]: Deft. #2. U. S. District Court, Southern District of California. Before Hon. Lynn Helm, Special Master. Layne & Bowler Corporation, Complainant, vs. American Well & Prospecting Co. et al., Defendants. In Equity—No. E-42. Defts. Ex. #2. Filed Mar. 1, 1920. Filed July 14, 1920. Chas. N. Williams, Clerk. By R. S. Zimmerman, Deputy Clerk.

No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Jan. 6, 1921. F. D. Monckton, Clerk.

[Endorsed]: Printed Transcript of Record. Filed January 29, 1921. F. D. Monckton, Clerk.



No. 3627

**United States
Circuit Court of Appeals**

For the Ninth Circuit.

WESTERN WELL WORKS, INCORPORATED,
a Corporation, **ROTARY DRILLING &
DEVELOPMENT COMPANY,** a Corpora-
tion, **STANLEY M. HALSTEAD, P. E.**
VAUGHAN and ALLEN W. ROSS,
Appellants,

vs.

LAYNE & BOWLER CORPORATION, a Corpo-
ration,
Appellee.

**Upon Appeal from the Southern Division of the
United States District Court for the
Northern District of California,
Second Division.**

**PROCEEDINGS HAD IN THE
UNITED STATES CIRCUIT COURT OF APPEALS
FOR THE NINTH CIRCUIT.**

At a stated term to wit, the October Term, A. D. 1920, of the United States Circuit Court of Appeals for the Ninth Circuit, held in the courtroom thereof, in the City and County of San Francisco, in the State of California, on Tuesday, the first day of March, in the year of our Lord one thousand nine hundred and twenty-one. Present: Honorable WILLIAM B. GILBERT, Senior Circuit Judge, Presiding; Honorable WILLIAM W. MORROW, Circuit Judge; Honorable CHARLES E. WOLVERTON, District Judge.

No. 3627.

WESTERN WELL WORKS, INCORPORATED,
a Corporation, et al.,

Appellants,

vs.

LAYNE & BOWLER CORPORATION, a Corporation,

Appellee.

Order of Submission.

ORDERED appeal in the above-entitled cause argued by Mr. Charles E. Townsend, counsel for the appellants, and by Mr. Frederick S. Lyon, counsel for the appellee, and by Mr. Charles C. Montgomery, as *amicus curiae*, and submitted to the Court for consideration and decision, with leave to counsel for the respective parties to file further briefs.

At a stated term to wit, the October Term, A. D. 1921, of the United States Circuit Court of Appeals for the Ninth Circuit, held in the courtroom thereof, in the City and County of San Francisco, in the State of California, on Monday, the seventeenth day of October, in the year of our Lord one thousand, nine hundred and twenty-one. Present: Honorable WILLIAM B. GILBERT, Senior Circuit Judge, Presiding; Honorable ERSKINE M. ROSS, Circuit Judge; Honorable WILLIAM H. HUNT, Circuit Judge.

No. 3627.

WESTERN WELL WORKS, INC., a Corporation,
ROTARY DRILLING & DEVELOPMENT
COMPANY, a Corporation, STENLEY M.
HALSTEAD, P. E. VAUGHN and ALLEN
W. ROSS,

Appellants,

vs.

LAYNE & BOWLER CORPORATION,

Appellee.

**Order Directing Filing of Opinion and Dissenting
Opinion and Filing and Recording of Decree.**

By direction of the Honorable William B. Gilbert and William W. Morrow, Circuit Judges, and the Honorable Charles E. Wolverton, District Judge, before whom the cause was heard, ORDERED that the typewritten opinion this day

rendered by this Court in the above-entitled cause be forthwith filed by the clerk, and that an order be filed, and recorded in the minutes of this court, in said cause in accordance with said opinion.

By direction of the Honorable William B. Gilbert, Circuit Judge, ORDERED that the dissenting opinion written by him, and this day rendered in said cause, be forthwith filed by the clerk.

In the United States Circuit Court of Appeals for
the Ninth Circuit.

No. 3627.

WESTERN WELL WORKS, INC., a Corporation,
ROTARY DRILLING & DEVELOPMENT
COMPANY, a Corporation, STANLEY M.
HALSTEAD, P. E. VAUGHN and ALLEN
W. ROSS,

Defendants and Appellants,

vs.

LAYNE & BOWLER CORPORATION,
Plaintiff and Appellee.

Opinion U. S. Circuit Court of Appeals.

Upon Appeal from the Southern Division of the
United States District Court for the Northern
District of California, Second Division.

IN EQUITY: Suit brought by the Layne & Bowler Corporation against the Western Well Works, Inc., Rotary Drilling & Development

Company, a Corporation, Stanley M. Halstead, P. E. Vaughn, and Allen W. Ross. Decree for the Plaintiff. Defendant appeals.

This suit was brought for infringement of Claims 9, 13, and 20 of letters patent No. 821,653, issued May 29, 1906, on an application filed April 28, 1903, to Mahlon E. Layne for "Well Mechanism," the plaintiff and appellee being the assignee of said Layne.

CHAS. E. TOWNSEND, WM. A. LOFTUS, Attorneys for Appellants.

WILLIAM K. WHITE, FREDERICK S. LYON, Attorneys for Appellee.

RAYMOND I. BLAKESLEE, CHARLES C. MONTGOMERY, Attorneys for *Amici Curiae*.

Before GILBERT and MORROW, Circuit Judges, and WOLVERTON, District Judge.

MORROW, Circuit Judge:

This is an appeal by the defendants from the interlocutory decree of the District Court of the United States for the Northern District of California, Second Division, entered December 31, 1920. The validity of Patent No. 821,653 for "Well Mechanism" and the infringement of claims 9, 13, and 20 were in issue. The decree sustains the validity of the claims and holds that the defendants had infringed said claims, and directs a permanent injunction to issue against the defendants, enjoining and restraining them from making, using, selling, or causing to be made, used, or sold, any

well mechanism embodying or containing the invention described in said letters patent and claimed in and by said claims 9, 13, and 20.

In the application for the patent in suit, Layne declared that he had "invented certain new and useful improvements in Well Mechanism," and he specifies that his "invention relates to the apparatus used for drawing water from driven or Artesian wells, and particularly to the means for adjusting a pump therein."

The objects of the invention, he declares, "are, to provide means by which the piping and the pump may be all assembled in proper shape before inserting it into the well; to provide means by which a pump may be placed in any desired position in a well, centered, raised, or lowered and fixed in position by manipulating from the outside entirely; to provide means for adjusting the length of the piping leading from the pump to the surface at will and to lower the pump from time to time without taking it out of the well; to provide improved means for centering and fixing the pump in proper position in the well casing; to provide improved means for manipulating the packing of the pump shaft, and proper adjustment of the pump in place by means at the surface of the ground; to provide for the proper action of a pump without stopping up the well so that the water may be either flowed into or pumped out of the same at pleasure; to provide a superior mounting for a centrifugal pump in the well, manipulated from the surface of the ground; to provide an extensible pump shaft

separately supported at intervals along its length; to provide an automatic centering device for the pump in the well; to provide for mounting the pump and the shaft in a closed casing which is open to operate from the top; to obviate the necessity of making large wells for descending into them in order to arrange the pump, and to generally improve and cheapen the apparatus used for the above purposes."

The specification informs the public of the objects to be accomplished by the improvements in the Well Mechanism invented by the applicant, and for the purpose of claiming all his improvements in the Mechanism as inventions, he makes twenty-two claims. Six of these claims, namely, those numbered 1, 2, 8, 11, 16, and 19, assemble certain specified elements in each claim as forming in such claim a unit of invention in the Mechanism. The remaining claims, namely, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 17, 18, 20, 21, and 22, assemble certain specified elements in combination in each claim as also forming in such claim a unit of invention in the mechanism. The various elements in all these claims relate to the one principal invention of a "Well Mechanism." In that relation they are all designed to co-operate in co-operating towards the common end of being employed in an apparatus to be used for drawing clean water from a driven or Artesian well. The patent comes within the rule stated by Mr. Justice Story in *Wyeth vs. Stone*, 1st Story 271,292, 30 Fed. Cas. 18,107, page 723, where it was held that a patent for several

machines, each being a distinct and independent invention, is valid where they have a common purpose and are auxiliary to the same common end. It is not necessary, in order to maintain a suit upon such a patent, says the Court, "that there should be a violation of the patent throughout. It is sufficient if any one of the invented machines or improvements is wrongfully used; for that, *pro tanto*," violates the patent."

To the same effect is *Emerson vs. Hogg*, 2 Blatch. 1, 8; 8 Fed. Cas. 4,440, p. 613; *Hogg vs. Emerson*, 6 How. 437; *Hogg vs. Emerson*, 11 How. 587.

This rule applies to the invention described in a separate claim as well as to the invention described in the patent as a whole.

The claims charged to have been infringed in this case are 9, 13, and 20 of the combination class. For convenience and accuracy of reference we separate the elements of these claims into clauses, as follows:

CLAIM 9.

1. In a well mechanism
2. the combination with a pump casing, of
3. a rotary pump of
4. a jointed pump shaft and
5. a closed casing surrounding the pump shaft
6. from the pump to the top of the well.

CLAIM 13.

1. The combination with
2. a pump and its

3. actuating shaft of
4. a sectional casing therefor
5. provided at each end of each section with
6. a fixed block with
7. bearings for the shaft,
8. the casing being closed at the top and provided with
9. an air vent.

CLAIM 20.

1. The combination of
2. a well casing,
3. a rotary pump therein, and
4. a line shaft for the pump
5. entirely closed off from the water in the well.

Referring to the specification and assemblage of the parts of the mechanism in preferred forms illustrated in the drawings accompanying the application for the patent, we find that the "rotary pump" mentioned in clause 3 of claim 9, the "pump" mentioned in clause 2 of claim 13, and the "rotary pump" mentioned in clause 3 of claim 20, have the same identical function, and the approved form of the "pump" used by the inventor is a centrifugal pump. We find also that the "jointed pump shaft" mentioned in clause 4 of claim 9; the "actuating shaft" mentioned in clause 3 of claim 13, and the "line shaft" mentioned in clause 4 of claim 20, perform the same function, the preferred form of which is declared by the specification to be made in sections "which are attached together by means of sliding keys so as to allow of some vertical play with relation to each other."

We find also that the combination with a "pump casing" mentioned in clause 2 of claim 9, the "closed casing surrounding the pump shaft" mentioned in clause 5 of claim 9, the "sectional casing" mentioned in clause 4 of claim 13, the "casing being closed at the top" in clause 8 of claim 13, and the "well casing" of clause 2, claim 20, by which the pump is "entirely closed off from the water in the well" mentioned in the last two words of clause 4 and in clause 5 of claim 20, perform the same function, the preferred form of which is declared by the specification to be made in joints of any desired length, with stuffing box at surface of ground at top of pump, so that by the use of the packing-boxes an air-tight chamber can be maintained.

In clause 8 of claim 13 "the casing being closed at the top" is followed by the addition in clause 9, "and provided with an air vent," and the "sectional casing" of clause 4 of claim 13, is provided in clause 5 "at each end of each section" with "a fixed block" in clause 6, and with "bearings for the shaft" in clause 7.

This analysis discloses that the essential elements of these three claims consist of (1) a pump, and (2), a pump shaft entirely closed off from the water in the well by (3) a sectional pump casing provided at the end of each section with (4) a fixed block with (5) bearings for the shaft, and (6) the casing being closed at the top and provided with an air vent.

One of the problems for the inventor of this character of pump was to protect the bearings from

the sand and water carried up from the well bottom. Another problem was to provide a method for efficiently lubricating the bearings of the pump shaft while it was in operation. No one could descend into the driven well for that purpose, and while oil might be carried to the bearings in small pipes, it was also a problem to keep the used and spent oil from escaping into the water conduit.

To meet these problems the specification describes the closed casing as designed to keep the water out and retain clean fluid for the efficient lubrication of the shaft bearings.

It is contended by the plaintiff that this closed shaft casing has three functions, namely: (1) Protection of the shaft and its bearings from the water and sand pumped to the surface; (2) lubrication of the shaft bearings, and (3) alignment of the shaft.

In the specification we find that one of the functions claimed for this casing is to protect the shaft and its bearings from the water and sand pumped to the surface. Another function claimed is to enclose the means provided for the lubrication of the shaft bearings, but further than this the specification does not go.

In claim 18 the combination includes "a pump and means for suspending it from the top of the well." The plaintiff claims that by this suspension the pump hangs pendent from the top of the well like a plumb bob in the well cavity, and that the shaft casing will also so hang and thus hold in alignment the shaft bearings mounted within the

casing, and thereby maintain the shaft in alignment. But we do not find any claim for this suspended structure either in claim 9, 13, or 20, and there is no charge that claim 18 has been infringed.

There is a device mentioned in claim 7 of a combination with a well casing and a pump, a series of wedges suspended by rods from the top of the well for operating the same to wedge the pump casing against the well casing. In claim 8 it is said that these wedges are mounted upon toggle links. It is claimed that this device enters into the mechanism of the shaft casing and has also the function of alignment of the shaft, but there is no charge that either claim 7 or claim 8 has been infringed by the defendants, and it appears from the testimony that this device has been abandoned by the plaintiff and is no longer a part of the mechanism in actual use.

M. E. Layne, the patentee, was a witness for the plaintiff in this case. He was asked on cross-examination if he had ever used the wedges for the function specified in the patent or at all. His answer was: "We have never used the wedges." He was asked concerning the use of the toggles connecting with the wedges, or the parts represented by the rods or links connecting with the toggles, or the rods or links connecting with the wedges, and his reply was that none of them had ever been used. This testimony was given September 2d, 1920. The patent was issued to Mr. Layne May 29, 1906.

It seems clear to us that the alignment is not a function of the shaft casing, but is a function of the means used for suspending the apparatus from the top of the well, combined with the law of gravity. This means for suspending the mechanism is to operate on the shaft casing and not the shaft casing upon the means of suspension, and this suspending device for alignment provided for in claim 18 is no part of this controversy. In other words, we are of the opinion that alignment is not a function of any of the elements of either of the claims under consideration.

In *Wilson & Willard Mfg. Co. vs. Union Tool Co. et al.*, 249 Fed. 729, 734, this Court held "that the patentee is limited to his claims, and the patent is no broader than the claims, and, if the language of the claims in the patent is clear and distinct, the patentee is bound by the language he has employed." Citing *Keystone Bridge Co. vs. Phoenix Iron Co.*, 95 U. S. 274, where the Supreme Court of the United States say, on page 278:

"But the Courts have no right to enlarge a patent beyond the scope of its claim as allowed by the Patent Office. * * * When the terms of a claim in a patent are clear and distinct (as they always should be), the patentee, in a suit brought on the patent is bound by it. *Merrill vs. Yeomans*, 94 U. S. 568. He can claim nothing beyond it. But the defendant may at all times, under proper pleadings, resort to prior use and the general history of the art to assail the validity of a patent or to

restrain its construction. The door is then opened to the plaintiff to resort to the same kind of evidence in rebuttal; but he can never go beyond his claim. As patents are procured ex parte, the public is not bound by them, but the patentees are. And the latter cannot show that their invention is broader than the terms of their claim; or, if broader, they must be held to have surrendered the surplus to the public."

We have placed some emphasis upon the fact that all the claims in this patent relate to one principal operative invention of a well mechanism, and in that relation they all in a more or less direct and practical way were designed to co-operate and supplement each other to the common intent and purpose of being employed in an operating pump apparatus for a driven or artesian well, but when we turn to the analysis of the claims in suit, we find that the essential elements claimed to have been infringed are limited and narrow and relate only to combinations of a rotary pump with an actuating shaft entirely closed off from the water in the well by the casing surrounding the pump shaft.

This patent has been before the Circuit Court of Appeals in the Fifth Circuit, on the question of the validity of the patent and the infringement of certain of its claims. In *El Campo Mach. Co. vs. Layne*, 195 Fed. 83, it was held that the patent was valid and claim 13 infringed. In *Van Ness vs. Layne*, 213 Fed. 804, the patent was held valid and claim 20 infringed. In that case the Court sus-

tained the claim of the plaintiff that the protecting casing had three functions, namely: (1) To exclude water and detritus from the shaft and its bearings; (2) to provide a means of lubricating the bearings of each section of the shaft from the top of the well without removing the apparatus from it; and (3) to align the bearings and the shaft so as to prevent lateral displacement in the well and keep the shaft in a vertical position. But the Court was not very confident that the protective casing as set out in the specification contained novelty enough to constitute invention. The fact, however, that there was for some time an unfilled want for some such apparatus as that disclosed by the patent, in the deep well irrigating industry, persuaded the Court that the idea involved invention, though theoretically its novelty and patentability might admit of doubt. With respect to the third function of the shaft casing in aligning the bearings and pump shaft so as to keep the latter in a vertical position in the well, the Court was of the opinion that in the absence of intermediate support the tendency of the shaft, if suspended only from the top, would be to swing laterally in the well and so get out of alignment. The Court found that this tendency is corrected by taking advantage of the downward pressure of the shaft due to gravity, in connection with the intermediate bearings through which the shaft passes. The Court here refers to the bearings for the shaft mentioned in claim 13, but the Court found that the defendant's pump in that case infringed the closed pump casing only as to protection and lubrication.

With respect to alignment the defendant claimed that his pump was suspended from the top bearing exclusively, and that the lower bearing in his pump performed no function after the casing was fixed in position in the well, and that the intermediate bearings were functionally different from those of the patent in suit. The Court appears to have sustained the defendant's contention for it refused to find that claim 13 had been infringed, finding infringement only with respect to claim 20.

In *Getty vs. Layne*, 262 Fed. 141, the Court followed its decisions in the previous cases, determining the question of the validity of the patent in favor of the plaintiff, but the Court held that the patent was not entitled to the wide range of equivalents of a pioneer patent. With respect to claim 20 and the function of the closed casing, the Court held that the defendant's pump in that case could not be held to infringe the means that Layne used to keep the shaft properly aligned, since that was accomplished by suspending the mechanism from the top of the well, while the defendant's pump mechanism received its support by resting on the bottom of the well.

Our conclusion is that the shaft casing has only two functions: (1) To protect the shaft and its bearings from the water and sand pumped to the surface, and (2), to enclose the means provided for lubrication of the shaft bearings. The function of alignment is therefore dismissed from further consideration.

With respect to the shaft casing protecting the

shaft from the ingress of water, claim 20 provides that the line shaft shall be entirely closed off from the water. In the specification the inventor declares:

“I consider it of great advantage also to arrange the pump shaft in a closed casing with stuffing box at surface of ground at top of pump, so that by the use of the packing-boxes an air-tight chamber can be maintained, and water kept out of the casing * * * , or kept filled with clean liquid, if desired, thereby providing an efficient lubricating system for all bearings of the pump.”

There is a pipe or tubular shaft mentioned in the specification which has for one of its purposes a convenient means for forcing the liquid out of the pump shaft casing by forcing air in at the top of the casing. The function of this tubular shaft is further explained by the statement that by forcing air in at the top of the casing by means of a pipe located at that point, the liquid can be forced down into the bottom of the casing, and by means of a small opening at the bottom of the tubular shaft the fluid can be forced out at the top through a pipe outlet and thus keep the casing clear in order to leave the bearings clean therein and not interfere with the working of the pump; or, it is further stated that “this operation may be reversed.” This specification clearly calls for an air tight casing as provided in the other specification previously referred to.

In *Getty vs. Layne*, 262 Fed. 141, the Court on

page 143, in discussing lubrication referred to the closed casing as causing a stagnation of oil in the bearings. The Court said:

“Layne’s method of lubrication was to put the oil in at the top and to permit it to descend to each of the bearings, and remain stagnant within the shaft casing until ejected from the top after it had become spent by air pressure through an air vent. When it was ejected, it was replaced by clean oil from the top again. On the other hand, the oil was confined at the bottom of the well by use of a packing or stuffing box. Getty adopted a circulatory system of lubrication. By it the oil was introduced from the top, and descended to the lower bearings by gravity. However, at the bottom there was only a partial obstruction to its exit, presented by a long sleeve bearing. Its passage out from the shaft casing was automatic and continuous, so that there was a constant and free flow of lubricant from the top of the line shaft, throughout its length, and out through its bottom. This method was claimed to be necessary to Getty’s device, because wear on the upper bearing required a continuous supply of fresh oil for its proper lubrication. These functional differences between the stagnant and circulatory systems of lubrication prevent their being considered as merely mechanical equivalents.”

The difference between the Layne patent and the Getty mechanism, as it appears in *Getty vs. Layne, supra*, is essentially the difference between the Layne patent and the defendants' mechanism in this case. In the Layne patent the shaft casing is entirely closed, or that is the invention claimed in claim 20 and is necessarily the operative device of that claim and of claims 9 and 13, and by this device the oil becomes stagnant in the bearings and is blown out when sufficiently used or spent, while the defendants' shaft is not entirely closed but permits the oil to circulate down through the bearings and out at the bottom while the pump is in operation.

We are of the opinion that there is invention in the entirely closed casing of the Layne patent as claimed in claims 9, 13, and 20, particularly claim 20, functioning as it does in complete protection to the line shaft from the ingress of water and sand and in protecting the means for lubrication.

The next question is that of infringement. Have the defendants infringed claims 9, 13, and 20 of the plaintiff as thus construed and limited?

The defendants in their answer deny infringement of plaintiff's patent and allege that the well mechanism charged by the plaintiff as an infringement of the patent in this case, was manufactured in accordance with and under the protection of letters patent No. 1,228,770, issued to Stanley M. Halstead, June 5, 1917.

In *Ransome vs. Hyatt*, 69 Fed. 148, this Court held that the issuance of a later patent was *prima facie* a presumption of a patentable difference between it and an earlier patent, following the decision of the Supreme Court in *Miller vs. Eagle Mfg. Co.*, 151 U. S. 186, 208; *Boyd vs. Janesville Hay Tool Co.*, 158 U. S. 260, 261. It is also a rule of law that infringement being denied, the burden of proof is upon the plaintiff to establish the charge. *Fuller vs. Gentzger*, 94 U. S. 299, 305; *Bates vs. Coe*, 98 U. S. 31, 49. We start then, with a presumption in favor of the defendants' apparatus under the Halstead patent, and against the alleged infringement, and the burden of proof upon the plaintiff to establish infringement.

The plaintiff contends that there is no substantial difference between the two mechanisms; that defendants' mechanism, as installed, accomplishes the same result as the plaintiff's by substantially the same means, operating in substantially the same way. The court below was of that opinion. The controversy requires a careful examination of the defendants' apparatus in performing the function of protection to the shaft and in the lubrication of the bearings.

In the application for the Halstead patent the inventor stated that one of the objects of the invention was to keep the bearings of the pump shaft properly lubricated. The means for such lubrication is set forth in the specifications. It will be seen that the means involves also the method

of protection, or lack of protection, to the shaft bearings. The specification is as follows:

“When these parts are properly assembled and fitted * * *, I am enabled to lubricate all of the bearings with a very small amount of oil in an emulsified form. * * * conduits * * * do not fit tightly into their respective rabbets, but effect a loose sliding fit, thereby permitting a small amount of water to work its way through into the interior of said conduits at these points, the water thus entering being practically free of sand or grit of any kind because of the filtering action of the small space through which it makes its way. This provision for a small quantity of water in the conduits is made so that when oil is fed into the top bearing * * * and makes it way through said bearing down the shaft to the second bearing * * *, it mixes with the water at said bearing and is emulsified by the rotary action of the shaft * * *. This emulsion passes down through the successive bearings until the bottom bearing * * * is reached where it passes out through channel * * * and auxilliary conduits into the well proper. * * *

“It is of course well known that clear water is an excellent lubricant, but the tendency of the shaft to corrode renders its use objectionable when used alone. The use of oil alone is highly objectionable as it contaminates the water to such a degree as to become a nuisance

when fed from the top or bottom, and requires a more or less complicated system of pipes when fed directly to each bearing, besides adding considerably to the expense of operating. I obviate these objectionable features by using an oil emulsion as a lubricant as above described, thereby providing a cheap lubricating medium, preventing corrosion of the shaft, not contaminating the water delivered and, on account of the constant flow of water through the bearings, providing an efficient cooling system for said bearings."

We have not had the opportunity of seeing the plaintiff's pump at work, nor that of the defendants, but we have carefully examined and analyzed the specifications and claims of both patents and have endeavored to understand their mechanisms and the methods of their operation, by the aid of the expert testimony. The fact remains, however, that we must depend largely upon the facts as related by the witnesses concerning the actual working of these pumps.

E. P. Lesley, a professor of mechanical engineering at Stanford University, was called as a witness for the defendants at the trial. He testified that he had been familiar with the defendants' pump for about two years. In the past year he had been retained by them in an advisory capacity and he had watched operations in their shop; had examined their pump and had superintended the installation of one pump at Stanford University; had tested

the pumps manufactured by the Western Well Works, making observations of the various component parts. Referring to the model of the pump in evidence, he identified it as representing substantially the Halstead patent. He explained the operation of the model as follows:

“In operation, this pump is driven from the top, either by a belt connection or a direct connecting motor, and the runner is rotated; the centrifugal action of the runner drives the water out in the passage of the discharge column, and it is delivered at the surface of the ground, or above the surface, as may be desired. The particular feature of this pump which may need further explanation is the lubricating system. The top, what has been called the top tube bearing No. 11 is provided with holes that are adapted to receive an oil pipe, to which is attached a drip feed oil cup. Oil is fed into a small receptacle, which is channeled in the upper end of the tube bearing member, No. 11, and as the shaft is rotated it is fed and moved by gravity down the shaft enclosing casing, No. 8, until it reaches a point near the top of the pump, where it may meet, or where it meets a recess that is cored in the part No. 17, in the bearing part of No. 17; here are provided two drain pipes; these are made in this side installation of quarter-inch pipe that is inserted in the mold before casting. These drain pipes are open to the well without the discharge casing, so that lubricant fed and moving by gravity, or fed by other means down the

shaft-enclosing casing, runs out into the well at this point."

The witness was asked if he had made any tests to satisfy himself that the mode of operation he had described was correct. He replied that he had made a number of tests as to the operation of the defendants' pump with respect to lubrication. The tests were made after the commencement of the suit. One of the tests was of a pump installed by the defendant The Western Well Works Corporation, at the farm of E. W. Connant near San Jose, California. The evidence was introduced for the purpose of showing that there was a leakage of water through the line joints of the conduit or shaft casing as stated in the specification of the Halstead patent. It would not be practicable to refer to these tests in detail. They were not satisfactory to the Court below and were not accepted for the purpose of drawing inferences therefrom as the opinion of an expert, but it was held that such inferences would be drawn by the Court. The evidence did, however, tend to prove that some water passed through the conduit or shaft casing at the tube joints to the interior shaft. But there was testimony, on the other hand, tending to show that the connections of the shaft casing were so shaped as to be made tight, and that white lead was used on the joints and hard grease introduced into the interior of the casing so that no water of any amount could pass into the interior of the shaft casing. We think the preponderance of the testimony tended to establish that fact and we concur

with the Court below upon that question, but the controlling question still remains to be determined. Does the lubricating oil introduced into the defendants' shaft casing pass down through the bearings, and after being used and spent, finally pass out at the bottom of the shaft into the well proper through a channel or auxilliary conduit constructed for that purpose? If it does, then it is not the same mechanical device for lubrication claimed and specified in the plaintiff's patent. The plaintiff's device does not have any outlet for the used and spent oil to pass out into the well, and as we understand the mechanical construction of plaintiff's pump, it was devised, in part at least, for the specific purpose of avoiding that objection.

That this objection was deemed serious at that time appears from the testimony relating to the Byron Jackson pump set up in the defendants' answer as an anticipation of the Layne Mechanism. We did not discuss that feature of the case when we were considering the elements of the Layne patent, for the reason that while the Jackson pump appeared to be earlier in its conception in point of time, we did not deem it an anticipation in the element of the line shaft for the pump being entirely closed off from the water in the well, as claimed in claim 20 of the Layne patent. The testimony relating to this feature of the Jackson pump mechanism is found in the testimony of Daniel W. Mead, a graduate of Cornell University, a civil engineer by profession, and a professor of hydraulic and sanitary engineering at the University

of Wisconsin. He was employed to develop the water supply for the city of Rockford, Illinois. In that connection he came to San Francisco to interview various manufacturers of centrifugal pumping machines and met among others Byron Jackson of the Byron Jackson Machinery Company, who was engaged in the manufacture of centrifugal pumps. With a representative of that company Professor Mead visited pumping plants in the Sacramento Valley and in San Jose, California. He entered into a contract for the furnishing of three pumps for the City of Rockford, Illinois, to be operated 85 feet below the surface in a shaft 15 feet in diameter. The pumps were furnished and worked successfully. He was employed to develop a great many deep wells, which he did, using the Byron Jackson centrifugal pump, in bored wells of from 8 to 15 inches in diameter. Among others, one for the Pabst Brewing Company at Milwaukee, Wisconsin. This pump was installed in 1903, and raised the water about 200 feet in a bored well 15 inches in diameter. The correspondence between Professor Mead and Byron Jackson Machine Works relating to this pump for the Pabst Brewing Company, is in the record, from which it appears that Jackson was asked for the designs for a centrifugal pump for a well of the specified dimensions. Jackson replied under date of February 17, 1902, that he could design a pump for a 16 inch well to be placed 150 feet below the surface, to discharge directly into the center of the shaft running through the pipes, thus to be

coupled up and hung in the well by the pipe, having no other frame work. "But the difficulty in this problem," he said, "is oiling the shafting and friction of couplings in water." After some correspondence Professor Mead came to San Francisco and saw Mr. Jackson upon the subject of pumps and their construction.

In the correspondence and discussion that followed between Mead and Jackson, the witness said that he, himself, did not appreciate the necessity of an inner pipe and raised the objection that it added to the expense and inquired why it was used. Jackson called the attention of the witness to the fact that in deep wells frequently more or less sand is discharged and that the sand coming up in the water is apt to get in the bearings and destroy them. Another point he made was that water lubrication was not satisfactory and that the bearings should be lubricated with oil; that the bearings of the shaft were to be located inside the central pipe so that they could receive oil from the surface and be free from the action of either standing water or water discharged by the pump, and the bearing plates were also to act as a separator between the outer pipe and the inner pipe, and to give together with the pipes a continuous connection from the drive head above to the pumps below.

Under date of April 20, 1903, the Pabst Brewing Co. submitted to Byron Jackson the form of agreement for the construction of a centrifugal pump for a 15 inch well 200 feet deep, to be delivered

within sixty days. The agreement contains specifications for the pump, among others: "Bearings approximately every ten (10) feet and suitable means for providing for oiling the same, which will allow no mixture of oil and water."

Under date of April 29, 1903, Jackson wrote to Professor Mead in Chicago, as follows:

"It is true that this design of a pump does not take very much material or work after it is once developed, but at present no such pump has been developed and I want to get a price that will help to pay for the developing, and now that I have the order for the Pabst Brewing Company, I propose to make this pump and test it anyway, whether it is ever shipped and installed or not."

In a letter dated May 22, 1903, Jackson refused to sign the contract for the pump, containing a clause providing that there should be no discharge into the well of a mixture of oil and water. He states his objection to that part of the contract as follows:

"In your contract under heading of 'pump' in the line next to the last on the first page, reading as follows:—'which will allow no mixture of the oil and water.' I think this is an impossibility to make such a design, besides my blue-prints are very clear and show that the excess of oil after passing through all the bearings on the line shaft will discharge into the well, and I specially mention this in some of my correspondence with Mr. Mead. This

objection, however, is a common one and was made at Rockford and many other places where we put in city waterworks pumps, but after years of use, the amount of oil passing into the water has not proved a serious item; but if it is a serious item in your case, I do not know how to remedy it and for this reason, if no other, I would have to decline your contract."

Under date of June 9, 1903, Mr. Jackson again wrote to Professor Mead that he would have to decline the Pabst contract, saying:

"I certainly was surprised that they should put in the contract that we would guarantee not to get any oil in the water, as that was impossible."

Again, under date of June 30th, 1903, Jackson wrote to Professor Mead, declining the contract, as follows:

"Now, I shall have to decline to sign this part of the contract, because the undue quantity will all depends upon the amount of oil supplied to the oilers and the use for which the water may be intended, because I know of no method of retaining the oil in the bearings and all of the waste oil is there to pass into the water pumped."

In a letter dated September 5, 1903, Mr. Jackson still objects to the proposed contract, saying:

"You will note that I make no guarantee regarding oil injuring the water or making it in

any way unsuitable for the use of the Pabst Brewing Company. * * * There may be instances where the oil would accumulate on top of the water and be seen and commented on. If the oil is detrimental it is barely possible that some kinds of oil may be less detrimental than others; for instance, sweet oil, cottonseed oil, or even castor oil, might be good for the health."

The pump was finally accepted by the Pabst Brewing Company without the clause in the contract providing that there should be no discharge of oil into the water in the well.

The Layne application for a patent was filed in the patent office April 28, 1903. The dominant element in that invention was the claim for a line shaft for the pump entirely closed off from the water in the well. On the day following, that is to say, on April 29, 1903, Byron Jackson, an experienced and well known manufacturer of centrifugal pumps, who had developed substantially all the other essential elements of the Layne improvement but that one element, declared that a pump with that element in it had not been developed, (not then knowing, of course, of the application for the Layne patent), and on May 23, 1903, he declared that it was impossible to make a pump that would not allow a mixture of oil in the water, and on that account he declined to make the contract with the Pabst Company. This refusal to make a contract with the provision not to allow a mixture of oil and

water in the well, he repeated until it was waived by the Pabst Company and a pump accepted without it.

We think this evidence establishes very clearly that the Jackson mechanism was not an anticipation of that dominant feature of the Layne invention. The defendants' pump is substantially the Jackson mechanism with respect to the discharge of used or spent oil from the bottom shaft into the water of the well, and is therefore not an infringement of plaintiff's patent for an entirely closed casing for the line shaft.

The decree of the Court below is reversed with directions to dismiss the bill, with costs to the defendants.

[Endorsed]: Opinion. Filed October 17, 1921.
F. D. Monekton, Clerk. By Paul P. O'Brien,
Deputy Clerk.

In the United States Circuit Court of Appeals for
the Ninth Circuit.

No. 3627.

WESTERN WELL WORKS, INC., a Corpora-
tion, **ROTARY DRILLING & DEVELOP-**
MENT COMPANY, a Corporation, **STAN-**
LEY M. HALSTEAD, P. E. VAUGHAN
and **ALLEN W. ROSS,**

Defendants-Appellants,

vs.

LAYNE & BOWLER CORPORATION,
Plaintiff-Appellee.

Dissenting Opinion of Gilbert, C. J.

Before GILBERT and MORROW, Circuit Judges,
and WOLVERTON, District Judge.

GILBERT, Circuit Judge, Dissenting:

I submit that the question of infringement in this case is not determinable upon the mechanism described in the Halstead patent. It is determinable upon the mechanism which was actually used by the appellants at the time of the institution of the suit. The court below found, and it is so shown by the evidence, that while at the outset the appellants may have undertaken to follow the Halstead patent, they had abandoned it at the time when the suit was commenced, and were using great care so to construct their mechanism as to make a perfect union between casing and coupling with the complete exclusion of water; that the joints of their structure were sealed with white lead, and for a considerable distance the space between the driving shaft and the walls of the casing was packed with hard grease. There can be no doubt that the appellee's invention did, as was said in the case of *Getty vs. Layne*, 262 Fed. 141, "accomplish a revolution in the well-drilling industry." And while the invention may not be said to be of a pioneer character, it is, nevertheless, an invention of such merit as to be entitled to protection against a reasonable range of mechanical equivalents. In both the appellee's and appellants' mechanisms

the oil is introduced at the top in substantially the same manner, and by gravity it traverses the entire length of the shaft thereby lubricating all the bearings. In both there is some escape of oil through the lowest bearing. The contention that the two systems are differentiated in that the appellee's lubricating system is static, while that of the appellants' is circulatory is not sustained by the proofs. In the appellants' mechanism, the shaft casing being made impervious to water and packed with hard cup grease a distance above and below each bearing, the ingress of water is prevented, and the movement of the lubricating oil is impeded, so that there is no substantial difference in the operation of the two lubricating systems. Both use a closed casing surrounding the pump shaft from the pump to the top of the well, the casing being sufficiently closed to allow the feeding of a lubricating fluid down through the same to the various bearing parts for the shaft therein. Both accomplish the same result by substantially the same means, operated in substantially the same way. The fact that the appellants' static lubricants are supplemented by the use of an emulsifying oil is unimportant. The fact that in the appellants' mechanism more oil escapes from the lowest bearing than in the appellee's is also unimportant. The ultimate disposition of the lubricant after its office is fulfilled is immaterial. These differences do not enable the

appellants to appropriate the substance of the appellee's invention.

In brief, the evidence shows that the appellants, as does the appellee, use a deep well pump mechanism assembled unit by unit, and lowered into the well bore so as to hang from the surface, the mechanism consisting of: 1, a pump impeller attached to a sectional power shaft extending from the pump to the top of the well, and enclosed in a casing, 2, a water discharge sectional casing extending from the pump casing to the top of the well, 3, a sectional casing extending from the pump casing to the top of the well, provided at the end of each section with a fixed block, with bearings for the shaft closed at the top, the casing being adapted to hold the power shaft in alinement by means of the bearings, to protect the power shaft and its bearings from injurious action of sand or soil in the water, and to form a means for conducting lubricant from the top down through each shaft bearing.

I think that the decree of the Court below should be affirmed.

[Endorsed]: Dissenting Opinion of Gilbert, C. J. Filed October 17, 1921. F. D. Monckton, Clerk. By Paul P. O'Brien, Deputy Clerk.

United States Circuit Court of Appeals for the
Ninth Circuit.

No. 3627.

WESTERN WELL WORKS, INCORPORATED,
a Corporation, **ROTARY DRILLING & DE-**
VELOPMENT COMPANY, a Corporation,
STANLEY M. HALSTEAD, P. E.
VAUGHAN and ALLEN W. ROSS,
Appellants,

vs.

LAYNE & BOWLER CORPORATION, a Cor-
poration,
Appellee.

Decree U. S. Circuit Court of Appeals

Appeal from the Southern Division of the Dis-
trict Court of the United States for the Northern
District of California, Second Division.

This cause came on to be heard on the Transcript
of the Record from the Southern Division of the
District Court of the United States for the North-
ern District of California, Second Division, and
was duly submitted:

On consideration whereof, it is now here ordered,
adjudged, and decreed by this Court, that the de-
cree of the said District Court in this cause be,
and hereby is, reversed, with costs in favor of the
appellants and against the appellee, and that this
cause be and hereby is remanded to the said Dis-
trict Court with directions to dismiss the bill.

It is further ordered, adjudged and decreed by this Court, that the appellants recover against the appellee for their costs herein expended, and have execution therefor.

[Endorsed]: Decree. Filed and entered October 17, 1921. F. D. Monckton, Clerk. By Paul P. O'Brien, Deputy Clerk.

At a stated term, to wit, the October Term, A. D. 1921, of the United States Circuit Court of Appeals for the Ninth Circuit, held in the Courtroom thereof, in the City and County of San Francisco, in the State of California, on Monday, the sixteenth day of January in the year of our Lord one thousand nine hundred and twenty-two. Present: Honorable WILLIAM W. MORROW, Circuit Judge, Presiding, Honorable WILLIAM H. HUNT, Circuit Judge.

No. 3627.

WESTERN WELL WORKS, INC. (a Corporation,
ROTARY DRILLING & DEVELOPMENT COMPANY (a Corporation),
STANLEY M. HALSTEAD, P. E.
VAUGHAN and ALLEN W. ROSS,
Appellants,

vs.

LAYNE & BOWLER CORPORATION, a Corporation,

Appellee.

Order Denying Petition for Rehearing, etc.

The petition, filed November 16, 1921, on behalf of the appellee for a rehearing of the above-entitled cause being duly considered by the Honorable William B. Gilbert and William W. Morrow, Circuit Judges, and the Honorable Charles E. Wolverton, District Judge, before whom the cause was heard, by direction of the Honorable William W. Morrow, Circuit Judge, and the Honorable Charles E. Wolverton, District Judge, ORDERED that the said petition for rehearing be, and hereby is denied, the Honorable William B. Gilbert, Circuit Judge, dissenting from said order.

Upon motion of Mr. William K. White, on behalf of counsel for the appellee, ordered mandate stayed 40 days from date.

United States Circuit Court of Appeals for the
Ninth Circuit.

No. 3627.

WESTERN WELL WORKS, INC., a Corpora-
tion, ROTARY DRILLING & DEVEL-
OPMENT COMPANY, a Corporation,
STANLEY M. HALSTEAD, P. E.
VAUGHAN and ALLEN W. ROSS,
Appellants,

vs.

LAYNE & BOWLER CORPORATION, a Cor-
poration,

Appellee.

**Certificate of Clerk U. S. Circuit Court of Appeals
to Record Certified under Section 3 of Rule
37 of the Rules of the Supreme Court of the
United States.**

I, Frank D. Monekton, as Clerk of the United States Circuit Court of Appeals for the Ninth Circuit, do hereby certify the foregoing one thousand one hundred and fifty-four (1154) pages, numbered from and including 1 to and including 1154, and comprising three volumes, marked, respectively, Vol. I, Vol. II, and Vol. III, to be a full, true and correct copy of the entire record of the above-entitled case in the said Circuit Court of Appeals, excluding all original exhibits made pursuant to request of counsel for the appellee, and certified

1156 *Western Well Works, Inc., et al.*

under section 3 of Rule 37 of the rules of the Supreme Court of the United States, as the originals thereof remain on file and appear of record in my office.

ATTEST my hand and the seal of the said the United States Circuit Court of Appeals for the Ninth Circuit, at the City of San Francisco, in the State of California, this 26th day of January, A. D. 1922.

F. D. MONCKTON,
Clerk,

[Seal]

By Paul P. O'Brien,
Deputy Clerk.

UNITED STATES OF AMERICA, ss:

[Seal of the Supreme Court of the United States.]

The President of the United States of America to the Honorable the Judges of the United States Circuit Court of Appeals for the Ninth Circuit, Greeting:

Being informed that there is now pending before you a suit in which Western Wells Works, Inc., Rotary Drilling & Development Company, Stanley M. Halstead, P. E. Vaughan and Allen W. Ross, are appellants, and Layne & Bowler Corporation is appellee, No. 3627, which suit was removed into the said Circuit Court of Appeals by virtue of an appeal from the District Court of the United States for the Northern District of California, and we, being willing for certain reasons that the said cause and the record and proceedings therein should be certified by the said Circuit Court of Appeals and removed into the Supreme Court of the United States, Do hereby command you that you send without delay to the said Supreme Court, as aforesaid, the record and proceedings in said cause, so that the said Supreme Court may act thereon as of right and according to law ought to be done.

Witness the Honorable William H. Taft, Chief Justice of the United States, the sixth day of April, in the year of our Lord one thousand nine hundred and twenty-two.

WM. R. STANSBURY,

Clerk of the Supreme Court of the United States.

[Endorsed:] File No. 28,729. Supreme Court of the United States, October Term, 1921. No. 774. Layne & Bowler Corporation vs. Western Well Works, Inc., et al. Writ of Certiorari. No. 3627. United States Circuit Court of Appeals for the Ninth Circuit. Filed Apr. 18, 1922. F. D. Monckton, Clerk, By Paul P. O'Brien, Deputy Clerk.

United States Circuit Court of Appeals for the Ninthth Circuit.

No. 3627.

WESTERN WELL WORKS, INC., a Corporation; ROTARY DRILLING and Developing Company, a Corporation; Stanley M. Halstead, P. E. Vaughan, and Allen W. Ross, Appellants,

vs.

LAYNE & BOWLER CORPORATION, a Corporation, Appellee.

Stipulation as to Return to Writ of Certiorari.

It is hereby stipulated and agreed that the certified transcript of record, heretofore furnished by the clerk of the above entitled court for and as part of the Petition of Layne & Bowler Corporation for a

Writ of Certiorari from the Supreme Court of the United States to this Court and filed in the Supreme Court of the United States in connection with said Petition for Certiorari, together with all original exhibits on file herein to be returned herewith, be taken and considered as a return to the Writ of Certiorari issued by the Supreme Court of the United States on April 6, 1922, in the above entitled case and used as the certified record and transcript of proceedings upon which said Writ of Certiorari shall be heard, tried and determined in the Supreme Court of the United States; and that a certified copy of this stipulation, certified by the clerk of this court, together with all said original exhibits herein, be returned to the Supreme Court of the United States in response to said Writ of Certiorari.

Dated: San Francisco, California, April 17, 1922.

| | |
|--------|--|
| (Sgd.) | FREDERICK S. LYON, |
| (Sgd.) | WILLIAM K. WHITE, |
| (Sgd.) | LEONARD S. LYON, |
| | <i>Solicitors and of Counsel for Appellee.</i> |
| (Sgd.) | CHAS. E. TOWNSEND, |
| (Sgd.) | FREDERIC D. MCKENNEY, |
| (Sgd.) | WM. A. LOFTUS, |
| | <i>Solicitors and of Counsel for Appellants.</i> |

[Endorsed:] Stipulation as to Return to Writ of Certiorari. Filed April 18, 1922. F. D. Monckton, Clerk, By Paul P. O'Brien, Deputy Clerk.

United States Circuit Court of Appeals for the Ninth Circuit.

No. 3627.

WESTERN WELL WORKS, INCORPORATED, a Corporation; ROTARY Drilling and Developing Company, a Corporation; Stanley M. Halstead, F. E. Vaughan, and Allen W. Ross, Appellants,

vs.

LAYNE & BOWLER CORPORATION, a Corporation, Appellee.

Certificate of Clerk U. S. Circuit Court of Appeals to Stipulation as to Return to Writ of Certiorari from the Supreme Court of the United States.

I, Frank D. Monckton, as Clerk of the United States Circuit Court of Appeals for the Ninth Circuit, do hereby certify the preceding page to be a full, true and correct copy of a "Stipulation as to Return to Writ of Certiorari," filed in the above entitled cause on the 18th day of April, A. D. 1922, as the original thereof remains on file and of record in my office.

Attest my hand and the seal of the United States Circuit Court of Appeals for the Ninth Circuit, at the City of San Francisco, in the State of California, this 18th day of April, A. D. 1922.

[Seal of United States Circuit Court of Appeals, Ninth Circuit.]

F. D. MONCKTON,
Clerk,
By PAUL P. O'BRIEN,
Deputy Clerk.

United States Circuit Court of Appeals for the Ninth Circuit.

No. 3627.

WESTERN WELL WORKS, INCORPORATED, a Corporation; ROTARY Drilling and Developing Company, a Corporation; Stanley M. Halstead, F. E. Vaughan, and Allen W. Ross, Appellants,

vs.

LAYNE & BOWLER CORPORATION, a Corporation, Appellee.

Return to Writ of Certiorari.

By direction of the Honorable the Judges of the United States Circuit Court of Appeals for the Ninth Circuit, I, Frank D. Monckton, as Clerk of said Court, in obedience to the annexed writ of certiorari, issued out of the Honorable the Supreme Court of the United States and addressed to the Honorable the Judges of the United States Circuit Court of Appeals for the Ninth Circuit, commanding them to send, without delay, to the said Supreme Court the record and proceedings in the above-entitled cause, do attach to the said writ a certified copy of:

(1) Stipulation as to Return to Writ of Certiorari, the original of which said Stipulation was filed in said cause on the 18th day of April, A. D. 1922; and

(2) Documentary Exhibits: Plaintiff's 1, 2, 3, 5, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17 and 20;

Clasmann Exhibits: 2, 3, 4, 5 and 6;

Defendant's A, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U and W; A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11 (2) and A12; M6 and M74;

Blue Prints: 69, 70, 71, 72, 73, 75, 76, 77, 78, 79, 92, 93 and 94; Blue Print—attached to deposition of Jackson et al.

Physical Exhibits: Plaintiff's 4, 6, 8 and 18 (iron sections of shafting and tubings);

Defendant's B, C and V (steel and metal models); X (wooden model of well pump); Y-1, Y-2, Y-4, Y-8 and V-ra (bottles of oils, etc.); Z (metal and iron model for mixing oils, etc.)

Not Marked: Steel shaft runner; Cardboards—drawing and patent plates, eight (8) pieces,

and in accordance with said stipulation, do hereby send the certified copy thereof, together with the original exhibits, to the said Supreme Court as the Return to the said Writ of Certiorari.

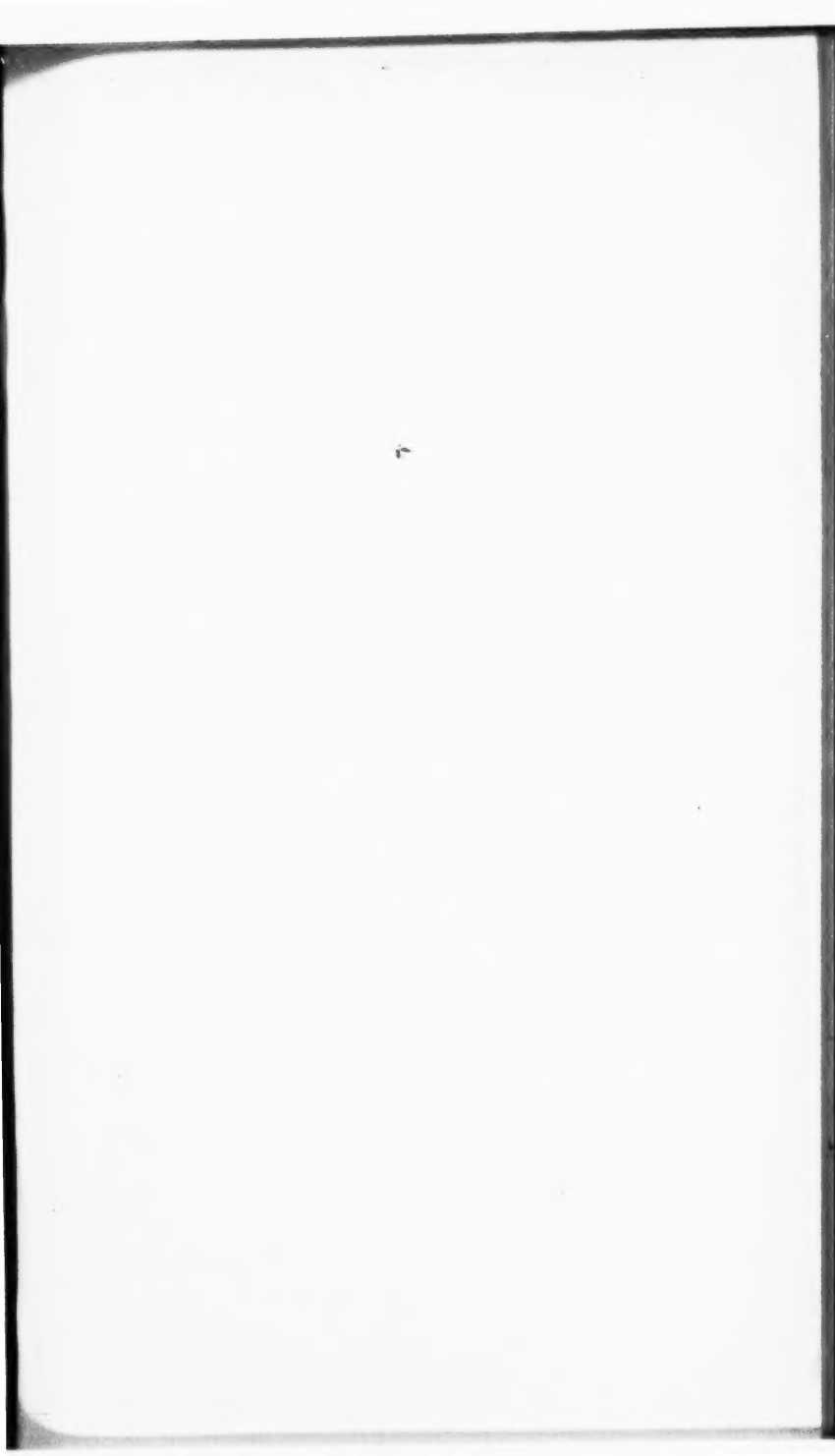
In testimony whereof, I have hereunto set my hand and affixed the Seal of the United States Circuit Court of Appeals for the Ninth Circuit, at the City of San Francisco, in the State of California, this 18th day of April, A. D. 1922.

[Seal of United States Circuit Court of Appeals, Ninth Circuit.]

F. D. MONCKTON,
Clerk,

By PAUL P. O'BRIEN,
Deputy Clerk.

[Endorsed:] File No. 28,729. Supreme Court U. S., October Term, 1921. Term No. 774. Layne & Bowler Corporation, Petitioner, vs. Western Well Works, Inc. Writ of certiorari and return. Filed April 24, 1922.



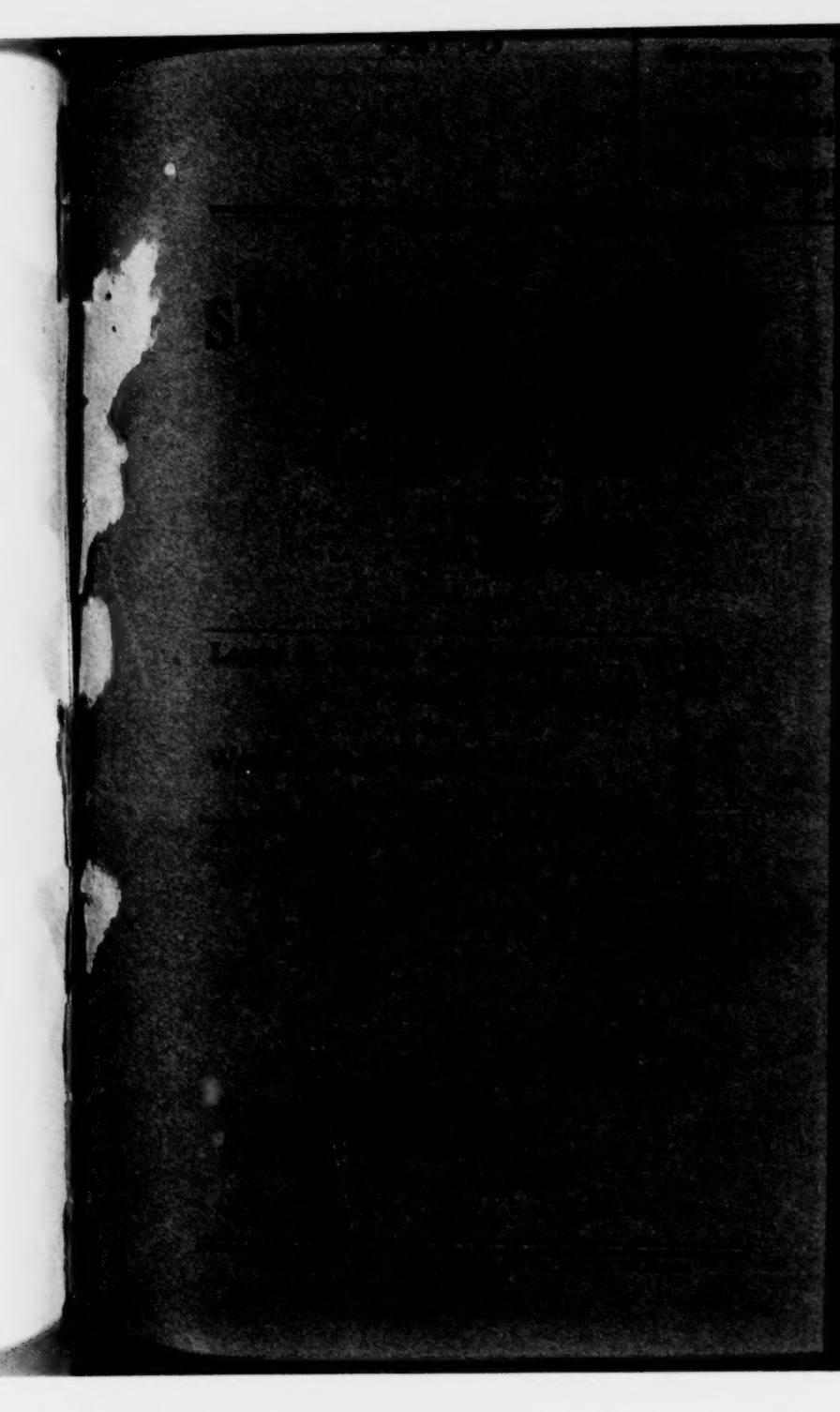


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Foreword.

(To adjust a pump in a driven well Layne devised, to surround the pump casing, a *system of wedges* to wedge against the well casing and to be manipulated by rods extending to the top of the well.

To carry the weight of the pump driving shaft he made the *shaft extensible* at its *joints* so that each section could be *separately supported*. To carry these sections of shaft he provided a sectional *shaft casing* extending from the wedge mounted pump casing to the top of the well, with *thrust bearing blocks* at the end of each section.

The wedge system was designed to adjust and center this mechanism, to fix it in place and "hold it in proper vertical position."

To *manipulate the shaft packing* he provided a *tubular rod* extending through the top of the shaft casing down to the cap of the bottom stuffing box.

To keep the bearings clean he provided an *air-vent* pipe to be used in co-operation with the tubular rod to force in air to force out fluid at the top.

He also considered it a great advantage to arrange the pump shaft in a closed casing "so that by the use of packing boxes an *air-tight* chamber can be maintained, and water kept out of the casing 20, or kept filled with clean liquid" for "a lubricating system".)

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IN THE
SUPREME COURT
OF THE
UNITED STATES.

No. 774.

Layne & Bowler Corporation,
Petitioner and Plaintiff.

vs.

Western Well Works, et al.,
Respondents and Defendants.

BRIEF OF AMICUS CURIAE.

May It Please Your Honors:

I.

STATEMENT.

Purpose of This Brief.

This suit is for alleged infringement of Layne Patent No. 821653, issued May 29, 1906. The District Court for the Northern District of California found claims 9, 13 and 20 of the patent, valid and infringed. The Circuit Court of Appeals for the Ninth Circuit reversed the decree, finding non-infringement. Plaintiff thereupon obtained certiorari from this court on the ground of alleged conflict of decisions be-

tween the Ninth and Fifth Circuits as to the interpretation of the patent.

As friends of the court, we have obtained leave to file this brief, to explain the restricted nature of the patent's claims under the adjudications; and the very narrow nature of the invention, if any; and to discuss the scope and argue the invalidity of the claims in suit.

We purposely refrain from any comment upon, or discussion of, the alleged infringement by respondents' structure in order not to interfere with matters which do not concern us.

But, for the benefit of the public, the scope of the patent should be definitely fixed within limits not broader than those adjudicated in the Circuit Court of Appeals in the Fifth and Ninth Circuits, which have passed upon it. And the new defenses in the present case should be given due effect showing the invalidity of the claims involved.

(*Note*—Unless otherwise indicated, italics in quotations are ours. R refers to the record with page number following.)

II.

WHAT DID LAYNE INVENT?

Layne's Objects and Means of Accomplishment, as Stated in the Patent.

Turning to the patent, an analysis of the objects, there stated, shows clearly what Layne attempted.

Mr. Layne's basic or underlying idea was of means for adjusting a water pump within a driven or artesian well.

The patent's introductory statement is:

"My invention relates to the apparatus used for drawing water from driven or Artesian wells, and *particularly* to the *means for adjusting a pump* therein." (Patent p. 1, ll. 8-11.)

The pump in common use at the time Mr. Layne and the others were developing their conceptions of a small bore deep well pump, was the "pit pump," so called because it was set on the bottom of a large open pit. Mr. Layne conceived the idea that by mounting a pump on a series of wedges instead of on the bottom of the open pit he could adjust the pump in a driven or artesian well.

This he proposed to accomplish by mounting the pump on wedges adjustable from the top of the ground by means of links, rods and sliding collars and in a modified form by means of screws and rods.

(1) *Means of Assembly — Wedge System.*
The first stated object in the patent is "to provide means by which the piping and the pump may be all assembled in proper shape before inserting it into the well." (Patent p. 1, ll. 12-15.)

The patent specification provides for attaching a pump casing to a shaft casing, the shaft casing carrying a shaft within, and running to the top of the well, bound together with a

side water discharge pipe—the assembled whole to be supported on a series of wedges. Thus he devised a “self-contained” apparatus which can be put together at the surface and lowered into the well as a whole.

The patent provides for assembly as follows:

“In order to *previously assemble* all the parts and then put the pump into the well and fix it in position therein, I provide a system of wedges 33, which serve to fix the pump in place and hold it in proper vertical position, designed to be operated by means from the top of the well, avoiding the necessity of a man’s going into the well in order to fix the pump in place.” (Patent p. 2, ll. 1-10.)

With respect to the *manner* of assembly the patent states:

“The *whole apparatus* being self-contained, can be put together in proper form and lowered into the well *at once*.” (Patent p. 3, ll. 66-69.)

The patent also states that by supporting the weight of the shaft in sections on blocks at the ends of the shaft casing sections that the pump shaft and shaft casing can be made in separable sections “and the parts *assembled before* putting them in the well.” (Patent p. 2, ll. 104-105.)

(2) *Placing and Fixing Position by Wedges.* The second stated object is “to provide means by which a pump may be placed in any desired position in a well, centered, raised or lowered and fixed in position by manipulating from the outside entirely.” (Patent p. 1, ll. 15-19.)

These means were the wedges, adjustable from the top of the ground by means of links, rods and sliding collars and in a modified form by means of screws and rods.

The importance of this object is emphasized by the fact that claims 1, 2, 3, 4, 5, 6, 7, 8, 12, 18, 21 and 22 (*twelve out of twenty-two claims allowed*) contain these elements, claims 6, 7, 8 and 12 being specific claims for the links, rods and collars. So also, five of the six rejected claims, original claims 1, 2, 9, 21 and 24, cover the wedges.

Mr. Layne conceived as his basic idea that a pump could be mounted on a series of wedges within a bored well and adjusted therein by means of links, collars and rods, "so that from the top the wedges 33 may be raised and lowered into place and can be tightened therein" (Patent p. 2, ll. 21-23), and manipulated "without going into the well." (Patent p. 2, ll. 26-27.) Mounting the pump on the wedges 33 obviated, in the inventor's conception, placing the pump on the bottom of the large open pit.

A series of co-operating wedges 62 and 63 are provided for a modified form of mounting.

The patent reads:

"Fig. 11 is a side view and partial section of a centrifugal pump *mounted* by a modified method." (Patent p. 1, ll. 72-74.)

Claim 3 describes the wedges as, "means for *supporting* the pump at any desired point in the well."

Claim 4 describes the wedges as,
“means for *supporting* the pump and shaft and casing at any desired point within the well.”

Van Ness v. Layne (C. C. A. 5th Cir.), 213 Fed. at p. 806, specifically adjudicates this element of claim 4 to be the wedges.

(3) *Adjusting Means — Wedge System.*
These same means of assembly, and for placing and fixing the pump in positions are also available to accomplish another stated object, “to provide means for adjusting the length of the piping leading from the pump to the surface at will and to lower the pump from time to time without taking it out of the well.” (Patent p. 1, ll. 19-23.) After loosening the wedges the structure could be lowered or raised and by drawing up the rods attached to the links could be again tightened in place.

In the *Van Ness* case (C. C. A.) the court said:

“We are satisfied, after reading the specifications and other claims of complainant’s patent, that the reference to the concluding element of this claim is to the system of wedges and not to the adding and subtracting of sections. Claim 6 expressly designates the system of wedges as the ‘means for fixing the pump in position at any desired point in the well casing,’ by the use of the final words ‘for the purposes specified,’ referring to the purposes declared in the preceding claim as quoted. Then the addition or withdrawal of sections

does not accomplish the fixing of the pump casing at any desired point in the well, but only at certain points where the joints between the sections are located, whereas, by the wedge system the apparatus can be fixed at any point whatever in the well.

"For these reasons we do not find that defendant's pump infringes claim 4, since it admittedly has no system of wedges." (213 Fed. 806.)

(4) *Centering with Wedges.* The wedges being in series, three being indicated around the pump, were available also as "improved means for centering and fixing the pump in proper position in the well casing." (Patent p. 1, ll. 23-25. See (2) *supra* also.)

Claim 2 covers this, reading:

"means for fixing the pump at any desired point in the *center* of the well casing."

Also rejected original claim 2 describes them as,

"centering and wedging devises."

(5) *Manipulation of Shaft Packing.* Inasmuch as the shaft casing is to be inserted in a driven well into which a man could not descend it was one of the inventor's further objects "to provide improved means for manipulating the packing of the pump shaft" (Patent p. 1, ll. 25-27) in order to maintain the "air-tight chamber" for lubrication. (Patent p. 3, l. 78.) Like the manipulation of the wedges this must also be done from the top of the well. For this purpose a tubular rod 44 was

run down inside the shaft casing to operate a screw provided with a sprocket wheel to turn two other screws at the same time to compress the packing in box 40." (Patent p. 2, ll. 66-82.)

(6) *Adjustment in Place by Wedge System.* The wedges with the sliding collars, rods and links and, in the modified form, screws and rods, serve the purpose stated, to provide "proper adjustment of the pump in place by means at the surface of the ground." (Patent p. 1, ll. 27-29.)

These means are described with great particularity, for the preferred form page 2, lines 10 to 35; and for the modified form, page 2, lines 115 to 124, 127 to 130, and page 3, lines 1 to 14 of the patent.

Four specific claims were allowed to cover these features and another proposed but rejected.

Claim 6. "* * * a series of wedges operated from the top of the well by means of links, a series of wedges carried by the pump casing and operated by toggle links attached to a rod extended to the top of the well,"

Claim 7. "* * * a series of wedges suspended by rods from the top of the well for operating the same to wedge the pump casing

Claim 8. "* * * a series of wedges mounted upon toggle links therein to wedge the said (pump) casing against the side walls of the well casing * * *

Claim 12. "* * * wedges * * * a collar thereon (on the shaft casing) and links

extending from said collar to the top of the well and to said wedges.”

Rejected claim original 9 on the modified form of wedges. “* * * of two series of wedges with means for moving them in relation to each other. * * *”

(7) *Control of Water Flow by Annular Wedges.* The co-operating wedges 62 and 63 also have another function; to seal off the well, or to control the flow of the water.

By reason of this they fulfill the object, “to provide for the proper action of the pump without stopping up the well, so that water may be either flowed into or pumped out of the same at pleasure.” (Patent p. 1, ll. 29-32.)

Claim 2. “* * * means for fixing the pump at any desired point in the center of the well casing and sealing said shaft off from the water in the well. * * *”

Rejected original claim 9. “* * * of two series of wedges with means for moving them in relation to each other. * * *”

Rejected claim 24. “* * * means whereby water is prevented from passing between the casing and the pump into the well.”

Claim 20. (Proposed after the rejection of original claims 9 and 24.) “* * * a line shaft for the pump entirely closed off from the water in the well.”

Claim 22. (Before amendment “* * * a shaft casing, and a discharge outlet from the pump independent of the shaft casing and sealed off from the well casing below the pump.” [R. 981.]

(8) *Mounting for the Pump, Wedges Manipulated from the Surface.* As above stated

the wedges were "to provide a superior mounting for a centrifugal pump in the well, manipulated from the surface of the ground" (Patent p. 1, ll. 32-35.)

(9) *Extensible Shaft Supported at Intervals in Each Section of Shaft Casing.* Another special object stated in the patent is "to provide an extensible pump shaft separately supported at intervals along its length." (Patent p. 1, ll. 35-37.)

Doing away with the open pit (which was not first accomplished by Layne) precluded the use of the open pit framework with step bearings for the shaft, and some other means were required for supporting the weight of the long heavy driving shaft with the pump impellers attached.

Byron Jackson had devised the single thrust bearing to suspend the shaft from the top of the well. Layne, however, thought that by making his shaft in sections and supporting each section of shaft on a thrust bearing held in place by the shaft casing he could satisfactorily support the weight of the shaft.

The specification reads:

"The weight of the shaft and pump below the block 47 is carried on the block 48; and from figure 8 it will be seen that a similar arrangement is made at the top of the next section of the shaft casing, where the block 47' supports the weight of the section of shaft 39' by means of the collar 48', connected by a pin and key as before." (Patent p. 2, ll. 49-57.)

Again the specification reads:

"It will be noted that the *weight of the pump and its shaft is supported at each end of the sections* of the casing by the blocks 47, 47' etc." (Patent p. 2, ll. 97-100.)

(10) *Automatic Centering by Wedges.* "To provide an *automatic* centering device for the pump in the well (Patent p. 1, ll. 37-38) the patent provides: "the wedges alone will be amply sufficient" (Patent p. 3, ll. 69-73) without the toggle levers to center the pump casing and hence would fulfill this object.

(11) *Mounting the Pump and Shaft on Thrust Collars Supported by Bearings Carried in a Closed Casing.* To give the shaft sectional support Layne provided, as stated above, a sectional shaft casing, extending to the top of the well, with thrust bearing blocks at the ends of each section, carrying thrust collars for the shaft sections. The casing is enlarged at the couplings in order to hold the bearing blocks in place. This gave means for the object stated "to provide for *mounting* the pump and the shaft in a closed casing which is open to operate from the top." (Patent p. 1, ll. 38-41.)

The patent reads:

"Fig. 7 is a section of a top of the well casing containing the pump shaft and its *mounting*." (Patent p. 1, ll. 63-65.)

(12) *Obviating Large Wells by Wedge System.* By mounting the pump on a series of wedges "designed to be operated by means from

the top of the well, avoiding the necessity of a man's going into the well in order to fix the pump in place" (Patent p. 2, ll. 7-10), he provided the means for accomplishing the object, "to obviate the necessity of making large wells in order to descend into them in order to arrange the pump * * *." (Patent p. 1, ll. 41-43.)

(13) *Improving and Cheapening the Apparatus by the Wedge System*. "generally to improve and cheapen the appartus used for the above purposes" (Patent p. 1, ll. 44-45) would also be accomplished by the wedge system doing away with the large pits.

The objects of the patent in the order of their statement, with the means for their accomplishment, may be summarized as follows:

1. *Assembly* as a whole by means of the *wedge* system and supporting the weight of the shaft in separate sections.

2. *Placing and Fixing in Position*, manipulating from the outside entirely by means of *wedges*, links and sliding collars, and in the modified form by concentric *wedges* operated by rods or screws.

3. *Adjustment of Length and Lowering* by means of *wedges* with rods and links and by sectional weight support of the shaft.

4. *Centering* by means of *wedges*.

5. *Manipulation of Shaft Packing* by means of the tubular rod, the sprocket wheel and screws for tightening the bottom stuffing box.

6. *Adjustment in Place* by means of *wedges*, links, collars and screws.

7. *Control of Water Flow* in modified form by means of a co-operating series of annular *wedges*.

8. *Mounting* the pump on *wedges* manipulated from the surface.

9. *Supporting the Extensible Shaft* by means of thrust bearings and collars.

10. *Automatic Centering* of the pump by means of *wedges*.

11. "*Mounting* the pump and shaft" by means of thrust bearings and collars, "in a closed casing," the casing being closed by the lower thrust bearing, stuffing boxes and sleeve bearings, but "which is open to operate from the top" through the tubular rod and air vent pipe.

12. *To Obviate Large Wells* by a system of *wedges* operated from the top.

13. *To Improve and Cheapen* the apparatus by means of the system of *wedges* to support the mechanism within a driven or artesian well.

Summary.

From the above analysis it appears that what Layne invented was in the main as follows:

(1) "Means for adjusting a pump" in "driven or Artesian wells," to-wit: "*a system of wedges*" which "serve to fix the pump in place." (Patent p. 1, ll. 10-11; p. 1, ll. 9-10; p. 2, ll. 4-5.)

A "modified form of apparatus which uses *a simple series of wedges* for fixing the pump in place" and for controlling the flow of water. (Patent p. 2, ll. 113-114, 115 *et seq.*)

(2) "An *extensible pump shaft* separately supported at intervals along its length." (Patent p. 1, ll. 35-37; p. 2, ll. 36-57.)

(3) Means "*for mounting the pump and the shaft* in a *closed casing* which is open to operate from the top," to-wit: mounting *bearing blocks* for the shaft sections at the ends of each section of shaft casing to support the shaft's weight in sections, the pump being attached to the lower section of shaft. (Patent p. 1, ll. 39-41; p. 2, ll. 49-57, 97-100.)

The shaft casing "is open to operate from the top" through two pipes. One is a tubular rod to manipulate the pump shaft packing. (Patent p. 1, ll. 25-27; p. 2, ll. 66-82.) The other is an *air vent* for "forcing in air" whereby "the fluid can be forced out at the top" through the opening in the tubular rod. (Patent p. 2, ll. 83-97.)

(4) An additional advantage is alleged for this arrangement "that by the use of the packing boxes an *air-tight chamber* can be main-

tained, and water kept out of the casing 20, or kept filled with clean liquid, if desired, thereby providing an efficient lubricating system for all the bearings of the pump." (Patent p. 3, ll. 74-83.)

III.

WHAT DO THE CLAIMS IN CONTROVERSY COVER?

The next subject on inquiry is as to what of this alleged invention is covered by the claims in controversy.

The Claims in Controversy, 9, 13 and 20.

Claim 9. "In well mechanism the combination with a pump casing, of a rotary pump of a jointed pump shaft and a closed casing surrounding the pump shaft from the pump to the top of the well."

Claim 13. "The combination with a pump and its actuating shaft of a sectional casing therefor provided at each end of each section with a fixed block with bearings for the shaft, the casing being closed at the top and provided with an air vent."

Claim 20. "The combination of a well casing, a rotary pump therein, and a line shaft for the pump entirely closed off from the water in the well."

Referring to the just preceding "Summary" it appears that there are four main elements in Layne's invention: (1) wedges (in modified form, water-tight) to fix the pump in place; (2) an extensible shaft sectionally supported; (3) mounted in a closed casing on thrust bear-

ings (4) the casing extending to the top of the well with a tubular rod through its top to manipulate the lower stuffing-box and an air-vent pipe at the top to keep the bearings clean by air pressure to force out spent fluid, the casing to be maintained as an "air-tight chamber" to be "kept filled" with clean liquid. Considering these elements and the above-quoted claims together we find as follows:

(1) Layne invented a *system of wedges* to adjust a pump in a driven or artesian well, wedging within the well casing a pump casing with side water discharge pipe and center shaft casing extending therefrom to the top of the well. A modified form controls the flow of water whereby the shaft may be "entirely closed off from the water in the well."

Claim 20 seems to be intended to cover this feature of the modified form. The concentric or annular wedges make the platform and pump casing water-tight within the well casing to thus make the shaft, as stated in claim 20 "entirely closed off from the water in the well," or as also expressed in claim 2 (not in suit) means "sealing said shaft off from the water in the well."

(2) As part of his invention Layne provided for a *shaft extensible* at its joints so that each section could be *independently supported* by collars resting on bearing blocks carried at the ends of the sections of shaft casing.

Claim 9 is intended to cover, among other elements, the "jointed" feature of the shaft.

Claim 13 specifically mentions the bearing blocks at the end of each section of shaft casing.

(3) The shaft casing "*mounting the pump and shaft*" as above mentioned by the bearing blocks carried at the end of each section, is "open to operate from the top" by a tubular rod, "for manipulating the packing of the pump shaft," and also by an "air vent" pipe to force in air to force out fluid through the opening in the tubular rod.

Claim 13 includes the bearings at each end of each section of shaft casing to support each section of shaft, and also the "air vent" for forcing in air to force out fluid.

(4) The shaft casing is closed at top and bottom by stuffing boxes "so that an *air-tight chamber* can be maintained, and water kept out" or "kept filled with clean liquid" thereby providing a "lubricating system."

Claim 9 covers this "closed casing."

Claim 13 stresses the closure at the top.

Claim 20 does not mention the casing, but it has been erroneously read in as a means to make the shaft "entirely closed off from the water in the well."

IV.

CLAIM 9.

Claim 9. "In well mechanism the combination with a pump casing, of a rotary pump of a *jointed pump shaft* and a closed casing surrounding the pump shaft from the pump to the top of the well."

The Jointed Pump Shaft.

One of the elements in claim 9 is "a jointed pump shaft."

The patent specification describes this "jointed pump shaft" as follows:

"The pump shaft also is made in sections 39, 39', 39'', which are attached together by means of sliding keys so as to allow of some vertical play with relation to each other. From figure 5 it will be seen that the shaft 39 passes through a block 47, and at its top is fixed in the bearing block 48 by means of the pin 50, as shown in figure 4. The next section of the shaft, 39', is inserted into the block 48, and prevented from rotating by means of the key 49, which is splined therein. The weight of the shaft and pump below the block 47 is carried by the block 48; and from figure 8 it will be seen that a similar arrangement is made at the top of the next section of the shaft casing, where the block 47' supports the weight of the section of shaft 39' by means of the collar 48', connected by a pin and key as before." (Patent p. 2, 11.38-57.)

The Layne file wrapper and contents show the following action taken with regard to claim 9, which is exceedingly illuminating as to the meaning of the term "jointed pump shaft."

Claim 9 was originally claim 12, which reads:

"In well mechanism the combination with a rotary pump of a jointed pump shaft and a closed casing surrounding the pump shaft from the pump to the top of the well." [R. 973.]

The patent office examiner, June 1, 1903, among other things stated [R. 977]:

"Claims 12 (*now* 9), 13 (*now* 10) and 18 (*now* 15) are rejected on the ground that it would not require invention to form the extensible shaft shown in the patent to Northam [R. 1029] with *joints* such as are shown in the patent to Barker, 264997, Sept. 26, 1882, Journal Boxes, Pullies and Shafting, Shafting."

In response to this letter Mr. Synnestvedt, Layne's attorney, on June 30, 1904, wrote the examiner, among other things:

"The references have been carefully examined. The examiner's attention is first called to the fact * * * and that the line shaft is supported at various points in the various sections, * * *" [R. 981.]

In this same letter, distinguishing Crannell, Layne's attorney, says: "* * * and the line shaft is not extensible, * * *" [R. 982.]

Layne's attorney also wrote:

"It does not appear how the Northam [R. 1029] pump can be held to show an extensible shaft inasmuch as the shaft that belongs to any one of the pumps is not extensible and the only way to extend the shaft at all is to put in a new pump * * *"

"The Barker device is not applicable as a reference to this case because it does not allow any play in the shaft itself; it merely allows the *entire shaft to move as a unit* through the

bearings and *this is not a feature which is applicable to this applicant's device * * **" [R. 982.]

The Northam patent [R. 1029] does not show a pump shaft which is extensible, but a series of pump shafts, each one of which is integral. * * * [R. 983.]

On February 15, 1904, the examiner again objects to the claim which had been renumbered as claim 9, saying:

"Claim 9 does not distinguish in terms from an aggregation of Northam [R. 1029] and Crannell [R. 1022], both of record, and is rejected." [R. 985.]

Northam has a jointed pump shaft, Crannell has a shaft-enclosed casing.

The Northam patent describes the shaft as coupled by universal joints consisting of knuckles secured by pins.

The Northam patent states:

"* * * the jointed pump shaft being adapted for well-casings that have become bent in driving * * *" [R. 1033, ll. 38-40.]

From the above record it is apparent that the "jointed pump shaft" of claim 9 is one which is so jointed as to be extensible, and support given to the weight of the shaft in sections. It could not be suspended as an entirety, nor does it allow "the entire shaft to move as a unit through the bearings" like Barker in the prior art (*supra*). The latter structure is the universal modern practice, and which Layne himself follows rather than his patent.

The other claims with the shaft as an element show that these features of extensibility and of sectional weight support are of the essence of the patent's shaft structure, and coincide with Layne's object "to provide an extensible pump shaft separately supported at intervals along its length." (Patent p. 1, ll. 35-37.)

Claims Including the Shaft.

3. "* * * an extensible pump shaft * * * independent supports for the shaft."
4. "* * * extensible pump shaft. * * *"
9. "* * * *jointed* pump shaft * * *"
10. "* * * a pump shaft supported at intervals by blocks pinned thereto and having *splined joints* in said blocks whereby the different sections of the pump shaft may have vertical play with relation to each other."
13. "The combination with a pump and its actuating shaft of a sectional casing therefor provided at each end of each section with a fixed block with bearings for the shaft * * *"
15. "* * * a pump shaft made in sections independently supported and *joined* by blocks and keys in the blocks and ends of the shaft sections * * *"
16. "A pump shaft made in sections, each section being suspended on a bearing by means of a block pinned to the shaft section and the next section being splined into said block to rotate therewith."
17. "* * * the shaft and casing being in sections and connected by bearings at each end, and the shaft section being separately supported in each section of the casing * * *"
19. "A pump shaft made in independently supported sections * * *"

20. “* * * a line shaft for the pump
* * *”
21. “* * * an extensible line shaft for
the pump * * *”

Alvord in his patent 735,691, page 1, lines 23-27, says, in his application filed December 24, 1902:

“The weight of this upright shaft and other rotating parts, together with the superimposed water column, is very great and it is a serious problem to guide and *support* the shaft.” [R. 936.]

To change Layne’s form of bearing would take the weight of the shaft off its casing and would require the use of means not at that time developed to suspend and support the shaft’s great weight.

To change the form of the thrust bearings would remove from the top of the sleeve bearings the physical obstruction of the weighted collars, than which no tighter closure has been devised. Water cannot get in nor oil out. The use of them necessitated a separate pipe by which Layne thought he could blow out spent lubricant. To meet that necessity, the inventor devised his adjustable stuffing box whereby he could screw the cap down tight and make, as he says, an “*air-tight* chamber” so that by means of an air vent he may blow out the used fluid.

Layne himself by his own testimony and that of his experts in former cases, and by the argu-

ments of his attorneys, showed how tight a closure was obtained by the use of *thrust bearings*.

Undoubtedly the "jointed shaft" is one slip-jointed as described in the patent to be carried section by section on thrust bearings.

Without sectional support Layne's shaft would fall apart as each splined key would allow its section to separate from the section next below.

The Fifth Circuit in the Van Ness case did not consider the jointed shaft as one with splined keys and pins as described in the patent, but nevertheless refused to sustain this claim 9 in addition to claim 20 with its "line shaft."

The Circuit Court of Appeals, Ninth Circuit, in the present case did not rely on the *jointed* shaft, as a distinguishing element in finding non-infringement, but contented itself with limiting the claim to the "entirely closed shaft casing."

In the interest of this industry we urge upon this court the further limitation of this claim 9 to the sectional extensible weight-supported shaft carried by bearings in each section of shaft casing and incapable of support *as a unit* by ball bearings at the top.

V.

CLAIM 13.

"The combination with a pump and its actuating shaft of a sectional casing therefor pro-

vided at each end of each section with a fixed block with bearings for the shaft, the casing being closed at the top and *provided with an air vent.*" (Patent p. 2, ll. 32-37.)

The Air Vent.

In the case of *Van Ness v. Layne* (C. C. A. 5th Cir.), 213 Fed. 804, the court held that claim 13 was not infringed by a structure that did not have an *air vent* whereby to force out water or spent lubricant. The court said, page 805:

"In the present case we are satisfied that claim 13 is not infringed by the Van Ness pump. The last clause of claim 13 reads 'the casing being closed at the top and provided with an air vent.' While the Van Ness pump is closed at the top, it is not contended that the pump has an air vent such as the patented pump had and such as the El Campo pump had. One function of this air vent is to force any water or spent lubricant remaining in the casing, out of it, through an aperture in the top, by forcing air through the air vent into the casing, for the purpose of substituting clean liquid or oil. It seems clear that the Van Ness pump had no such member with a corresponding function as the air vent of the patented pump or that of the El Campo pump, and so cannot be said to infringe claim 13. This, if correct, would prevent complainant from relying upon claim 13 in this case, as a ground of recovery."

No pump mechanism having a drive shaft enclosing casing would infringe claim 13 unless said casing were provided with such venting

orifices as adapted it to discharge water or spent lubricants in a manner similar to that disclosed by the patent. The means described in the patent are a tubular shaft 44 in combination with pipe 52.

The specification provides as follows:

"This pipe or tubular shaft 44 also serves the purpose of providing convenient means for forcing the liquid out of the pump shaft casing. By forcing air in at the top of the casing 20, by means of the pipe 52, the liquid can be forced down to the bottom of said casing 20, and by means of the small opening 45, in the bottom of the tubular shaft 44, the fluid can be forced out of the top 54, and keep the casing clear in order to leave the bearings clean therein and not interfere with the working of the pump, or by forcing fluid in at the top 54, the operation will be reversed, and the fluid ejected from pipe 52." (Patent p. 2, ll. 83-96.)

The Van Ness decision has ruled against plaintiff's contention and there is nothing in the patent which would lead to a contrary conclusion.

The claim was not sued on in the Getty case.

Claim 13 is the only place in the patent where the term "air vent" is used.

Plaintiff claims that Layne's "air vent" serves the same purpose as a vent in a coal-oil can. A vent in an oil can acts passively to admit air for the purpose of filling the space made vacant by the diminishing oil. Layne's patent specification, above quoted from, emphasizes the compulsory evacuating of liquid by

forcing in air or fluid at the top of the casing and through a pipe or tubular shaft. We again quote this specific language.

"This pipe or tubular shaft 44 also serves the purpose of providing convenient means for *forcing* the liquid out of the pump shaft casing. By *forcing* air in at the top of the casing 20, by means of the pipe 52, the liquid can be *forced* down to the bottom of said casing 20, and by means of the small opening 45, in the bottom of the tubular shaft 44, the fluid can be *forced* out *at the top* 54, and keep the casing clear in order to leave the bearings clean therein and not interfere with the working of the pump, or by *forcing* fluid in at the top 54, the operation will be reversed, and the fluid ejected from pipe 52." (Patent, p. 2, l. 83-96.)

Throughout the foregoing the idea of *forcing* air or liquid is stressed, and *always through pipes provided for that purpose*.

This idea was voiced in the Van Ness, C. C. A. case where the court said (213 Fed. 805):

"One function of this air vent is to *force* any water or spent lubricant remaining in the casing, out of it, through an aperture in the top, by *forcing* air through the air vent into the casing, for the purpose of substituting clean liquid or oil."

The air vent means of the patent has as its only purpose and function the ejection of spent fluid *at the top of the casing*. Discharge at the bottom of the casing is not an equivalent mode of operation, and a structure so discharging at the bottom and not the top could not infringe Claim 13.

Moreover, the pipe 44 is shown as being closed at its top by means of a valve or plug 54, from which it is obvious that Layne's idea was a stagnant system of lubrication, just as the Circuit Court of Appeals for the 5th Circuit held in the case of *Layne v. Getty*, 262 Fed. 141, followed and quoted by the 9th Circuit, in *Western Well Works v. Layne & Bowler Corporation*, 276 Fed. p. 471. The two circuits are in accord as to this stagnant system, being the lubricating system of the patent.

Getty v. Layne (5th Cir.), 262 Fed. 141, is quoted by *Western Well Works v. Layne & Bowler Corp.*, 276 Fed. 471, in part as follows:

"Layne's method of lubrication was to put the oil in at the top and to permit it to * * * remain stagnant * * * until ejected from the top * * * by air pressure through an *air vent*."

The Ninth Circuit Court of Appeals in the present case did not rely on the "air vent" as a distinguishing feature in finding non-infringement, but confined itself to the "entirely closed casing" as a necessary limitation to be read into said claim and preventing a finding of infringement by defendant's structure in this case.

Again, however, in the interest of this industry we urge upon this court the further limitation of this claim to an "air-vent" specifically in accordance with that defined in the patent as above indicated and as adjudicated

in the Fifth Circuit, in *Van Ness v. Layne* (C. C. A. 5th Cir.), 213 Fed. 804.

VI.

CLAIM 20.

Claim 20—"The combination of a well casing, a rotary pump therein, and a line shaft for the pump entirely closed off from the water in the well."

The Elements of Claim 20.

There are only three elements expressed in this combination claim: (1) a well casing, (2) a rotary pump, (3) and a line shaft for the pump.

The "rotary pump" has the descriptive word "therein" following it, referring to the well casing. The "line shaft" is described as "entirely closed off from the water in the well."

The claim is a *combination* claim. The combination of elements must have an operative or sub-operative function as the combination itself is old—a well casing, pump and shaft. The combination to be valid, therefore, should have some novelty of operation, function or construction, giving some new or improved and useful result.

(1) *The well casing* of claim 20 is not discussed by plaintiff's counsel. We do not have his views of what the function of the well casing is in this combination, nor how it contributes to impart an operative or sub-operative

function to the rest of the claim, or produce a new, improved or useful result.

As a mere receptacle for the pump and its drive shaft, the well casing 16 does not contribute to the operation of the rotary pump or drive shaft because they could operate just as efficiently in a well without a well casing, a pit, a pond, a lake or a river.

If the function of the well casing is to act as a water discharge conduit for the water in combination with a rotary pump and line shaft, then the combination is made up of co-operative elements—the line shaft to drive the pump, the rotary pump to lift the water from the well and the well casing to carry it to the surface of the ground.

If this be the intent of the claim then the wedges 62 are required as a sealing means to make the platform 61 water-tight.

The specification provides as to this:

"The pump casing has a platform 61, and a depending ring flange 66, and a series of wedges 63 are placed around the depending flange 66, and are connected to the top platform by means of a series of screws 65. A series of co-operating wedges 62 may also be provided, suspended from the platform 61 by means of the screws 64, and the two series of wedges surround the whole casing. It will, sometimes be convenient to dispense with the outlet pipe 23, and extend the casing 16 to the top, *to act itself as the conveying channel for the liquid.* In each case, of course, *the pump casing 21 and platform 61 will be made water-tight within the casing 16,*

and for this purpose the wedges 62 will be made in overlapping sections, in order to break the joints seen in Figure 12. The pumps will then deliver directly into the upper casing." [Patent, p. 2, ll. 115-130 and p. 3, ll. 1-4.]

These co-operating wedges 62 would make the "line shaft * * * entirely closed off from the *water in the well*" as specified in the claim, and as distinguished from the *water being pumped* above the platform 61. The co-operating wedges come within the meaning of this descriptive phrase and not the closed shaft casing expressed as an element in fifteen other claims, and at law *presumably intentionally omitted from this claim*.

The fifteen claims including the shaft casing describe it in the following language:

"1. A pump provided with a closed driving shaft casing extending to the top of the well from the pump * * *."

"2. A pump provided with a closed driving shaft casing extending to the top of the well from the pump * * *."

"4. * * * and protective casing for the shaft * * *."

"5. * * * a sectional pump shaft casing surrounding the pump shaft and extending to the top of the well * * *."

"9. * * * a closed casing surrounding the pump shaft from the pump to the top of the well."

"10. * * * and a closed shaft casing * * *"

"11. * * * a closed shaft casing protecting the bearings from the water * * *."

"12. * * * of a casing for a pump shaft * * *."

"13. * * * of a sectional casing therefor (the actuating shaft) * * *."

"14. * * * of a pump shaft casing closed at the top and bottom * * *."

"15. * * * and a closed casing around the shaft."

"17. * * * and shaft casing surrounding the shaft, the shaft and casing being in sections and connected by bearings at each end * * *."

"19. * * * a closed pipe * * *."

"21. * * * and a shaft casing entirely enclosing the shaft and bearings."

"22. * * * and shaft casing * * *."

In *Duncan v. Cincinnati Butchers' Sup. Co.*, 171 Fed. p. 663, the court said:

"* * * where the applicant for a patent in one claim makes no mention of an element, and in another includes it, the presumption is that he omitted it in the first on purpose."

The claim has been hitherto misconstrued. It does not include a "closed shaft casing" at all, but was designed to cover the modified form of wedges the same as claim 2.

Claim 2 describes the wedges as:

"means for fixing the pump at any desired point in the center of the well casing and *sealing said shaft off from the water in the well.*"

Another claim was proposed to cover these annular wedges with the function of making the pump casing 21 and platform 61 water-tight within the casing 16. (Patent p. 3, 11, 1-4.) That was claim 24, which was rejected.

It read:

"In well apparatus the combination of a pump, a casing therefor, means for fixing the

pump in predetermined desired position and means *whereby water is prevented from passing between the casing and the pump into the well.*" [R. p. 975.]

Before amendment claim 22 contained the following language:

"* * * a shaft casing, and a discharge outlet from the pump independent of the shaft casing and *scaled off from the well casing below the pump.*" [R. 981.]

It may be noted in passing that the well casing is not suspended, nor does it hang pendant from the top of the well, but is the wall of the well.

Generally speaking, the well casing and discharge casing are separate elements.

The discharge casing is specifically covered in claim 22, which speaks of it as "a discharge outlet from the pump independent of the shaft casing."

Claim 20 cannot by any possible stretch of the imagination include a concentric discharge casing hanging freely within the well casing.

Nothing in the patent suggests such a combination. In fact, the whole teaching of the patent is to lead away from such a device. The wedges, sliding collars and rods tend to keep the mind to the old side discharge pipe. There were no means then known of aligning the shaft casing within a concentric discharge casing.

The well casing as a discharge casing is not in any way the equivalent of the modern con-

centric discharge casing which hangs freely within the well casing and carries the shaft casing within and the pump below, *devoid of any of Layne's patented wedges.*

The well casing has no block and strap arrangement to bind it at intervals to the shaft casing. The well casing is not assembled with the pump mechanism for insertion unit by unit within the well, but lines the well hole to preserve the formation.

Its function in claim 20 is "to act itself as a conveying channel for the liquid" in combination with the annular wedges making the platform 61 water-tight. [Patent, p. 2, ll. 124-130.]

(2) *The rotary pump* is not peculiar or novel, but simply an old element in a combination claim. The only limitation of the pump in this claim is the word "therein," which refers to a well casing, that is, the rotary pump is in the well casing. The fact that it is stated as being in the well casing must have some significance, and this brings us again to the conclusion that the rotary pump in the well casing was intended to co-operate with the well casing in order to raise and discharge the water.

(3) *A line shaft* is also an old element and in an old combination, to-wit, a rotary pump within a well casing.

It should also be noted that the line shaft of the Layne patent is not suspended, nor does

it hang pendant from the top of the well, but each section is *independently supported* by means of the thrust bearing and collar.

One of the patent's objects is:

"to provide an extensible pump shaft separately supported at intervals along its length." [Patent, p. 1, ll. 35-37.]

The specification reads:

"The weight of the shaft and pump below the block 47 is carried by the block 48; and from Figure 8 it will be seen that a similar arrangement is made at the top of the next section of the shaft casing, where the block 47' supports the weight of the section of shaft 39' by means of the collar 48', connected by a pin and key as before." [Patent, p. 2, ll. 49-57.]

"It will be noticed that the weight of the pump and its shaft is supported at each end of the sections of the casing by the blocks 47, 47', etc." [Patent, p. 2, ll. 97-100.]

Claim 20 does not indicate any novelty in the line shaft as such. It does not specify the patent's separate supports nor the shaft's extensibility.

If there is any novelty in the claim it is not in the elements so far discussed, to-wit: the well casing, the rotary pump and the line shaft—nor in these three old elements in this old familiar combination.

If there be any novelty in the combination it must be from something read into the claim by reason of the clause describing the line shaft as "entirely closed off from the water in the well."

If this phrase indicates the means of sealing the pump casing and platform in the well casing so as to make the well casing operate as the water discharge conduit, there is a novel combination, to-wit: a rotary pump and line shaft in combination with wedges, sealing said line shaft off from the water in the well, thereby making the pump casing and platform watertight, whereby the well casing can be used as a water discharge conduit.

Examination of all the other claims containing the element "the well casing" shows that the well casing always co-operates with wedges to make an operative mechanism of the combinations covered by the claims.

From the claims including the well casing we quote the following language:

"1. * * * means for fixing the pump at any desired point in the well casing, substantially as described."

"2. * * * means for fixing the pump at any desired point in the center of the well casing and sealing said shaft off from water in the well, substantially as described."

"5. * * * means for fixing the pump in position at any desired point of the well casing."

"7. In combination with the well casing and a pump, a series of wedges suspended by rods from the top of the well for operating the same *to wedge the pump casing against the well casing*, substantially as described."

"8. In well mechanism a pump casing provided with a series of wedges mounted upon toggle links therein *to wedge the said casing against the side walls of the well casing*, substantially as described."

"12. In pump mechanism the combination of wedges for fixing the pump in the well casing, of a casing for the pump shaft, * * *."

"18. * * * * and devices for fixing it (a pump) at any desired point in the well casing * * *."

"21. The combination of a well casing, a rotary pump therein, means for fixing it at any desired point. * * *"

"22. The combination of a well casing, a rotary pump therein, means for fixing it at any desired point. * * *."

It is clear from the above claims that the function of the well casing is to furnish a solid wall against which the wedges may operate to wedge the pump casing in order to center and fix it in position at any desired point.

Claims 21 and 22 begin exactly in the same language as claim 20: "the combination of a well casing, a rotary pump therein * * *."

Claims 21 and 22 continue: "means for fixing at any desired point."

Whereas claim 20 emphasizes the other functions of the wedges stated in claim 2, "sealing said shaft off from water in the well," claim 20 reading:

"a line shaft for the pump entirely closed off from the water in the well."

What other function can the well casing have? How can it co-operate with the pump or shaft, either jointly or successively, except in combination with the wedges, either in the preferred or modified form?

Unless claim 20 be construed, as above contended by us, namely to read only on the modified form of figures 10 to 13 with the outlet pipe 23 dispensed with and the discharge of water up through the well casing, such claim 20 is obviously for a mere aggregation of elements as the well casing could in no manner co-operate with the other elements, "a rotary pump therein, and a line shaft for the pump entirely closed off from the water in the well."

The claim to be valid must be for an operative combination, and there cannot be read into it an element (the shaft casing) found in other claims, especially when that element has no co-operation with the others, and could not with them constitute an operative device.

Claim 20 with a shaft casing read in, does not form an operative combination, for the well casing has no co-operative function in such a combination.

In *Wilson v. McCormick Harvesting Mach. Co.* (7th C. C. A.) 92 Fed. 174, the court said:

"If a fulcrum cannot be supplied by implication, the claim is perhaps void, because it does not show an operative device; but that the hinge-bar, F, expressly included in the second claim, cannot be read into the third, where it is not mentioned, seems to be clear."

In the case at bar, if the concentric wedges (to co-operate with the well casing to operate as a water discharge conduit) cannot be sup-

plied by implication the claim is void, "because it does not show an operative device"; and the shaft casing, expressly included in fifteen other claims, cannot be read into claim 20 where it is not mentioned.

The following language of the opinion in *Doubleday v. Roess*, 11 Fed. 739, involving, as here, an apparatus for deep wells, is very pertinent if the claim be construed to include the shaft casing:

"What, then, have we in this case but a mere bringing together of old devices without any new and useful result being produced by their co-operation? That such a combination is not patentable is well settled. *Hailes v. Van Wormer*, 20 Wall. 353; *Reckendorfer v. Faber*, 92 U. S. 357.

"The result produced, it is said in *Pickering v. McCullough*, 21 O. G. 75, must be due to 'the joint and co-operating action of all the elements,' otherwise it is only mechanical juxtaposition and not a vital union, *Id.* I think the present is clearly a case of the mere aggregation of devices within the principle of the authorities cited."

For comparison we quote below claim 20, reading in the shaft casing and again quote it reading in the concentric wedges. The first is a mere aggregation of old elements, the second a combination of co-operative elements.

"The combination of a well casing, a rotary pump therein, and a line shaft for the pump entirely closed off from the water in the well," by a shaft casing.

"The combination of a well casing, a rotary pump therein, and a line shaft for the pump entirely closed off from the water in the well," by a series of co-operating wedges enabling the well casing to act as a conduit for the water.

Claim 20 has not been construed as we have above contended but the phrase, "entirely closed off from the water in the well," descriptive of a function of the shaft casing, has been held sufficient to read that element into the claim. And not only has the shaft casing been read in, but also intermediate bearings, and other elements and means to create functions not expressed in the claim.

A comparison of plaintiff's counsels' conception, stated in their own words, and the language of claim 20 in conjunction with the specification of the patent shows that the patent and claim have been stretched beyond all bounds.

Plaintiff's Counsels' Conception Compared With Claim. 20.

Plaintiff's counsels' conception of what Mr. Layne invented and embodied in his patent and covered by the claims in suit, is set out on page 6 of his petition for *Certiorari* and repeated on page 34 of his brief therewith.

We quote same below in one column and in the second column give the language of claim 20, with descriptive matter from the patent's specification.

It will readily be seen that plaintiff's counsel has substituted his own conception of what

Layne might have invented for what his patent actually discloses, that he has omitted several features stressed by the patent and added others not covered by the claim.

Claim 20—"The combination of a well casing, a rotary pump therein, and a line shaft for the pump entirely closed off from the water in the well."

Plaintiff's Counsels' Conception.

"Mr. Lavne invented his deep well pump mechanism, adapted to be assembled, *unit by unit*, at the mouth of the well bore and be successively lowered therein a *unit's length* after the addition of each succeeding unit.
(Counsels' italics.)

Claim 20 and the Patent.

Claim 20 does not involve means or method of assembly.

The patent specifies, not *unit by unit* method of assembly, but:

"The *whole* apparatus being self-contained, can be put together in proper form and lowered into the well *at once*." (Patent, p. 3, ll. 66-69.)

"In order to *previously assemble* all the parts and then put the pump into the well and fix it in position therein, I provide a system of wedges 33," (Patent, p. 2, ll. 1-5.)

So also supporting the shaft *weight* in sections (Patent, p. 2, ll. 100-105) is specified in connection with assembly.

"and, when completely assembled and lowered, to *hang pendant* from the surface, like a plumb bob:" (Counsels' italics).

Said mechanism consisting of, in combination:

(1) a *pump* attached to a *sectional line or power shaft* extending to the top of the well; (Counsels' italics).

(2) A *pump* casing inclosing the pump impeller; (Counsels' italics).

(3) "A *water discharge, sectional casing* connected to the pump casing and through which the pumped water passes to the top of the well;" (Counsels' italics).

Claim 20 does not involve suspension.

The patent's wedged in pump is the anthithesis of *hanging pendant* like a plumb bob. A plumb bob is not "mounted" on wedges (Patent, p. 1, ll. 72-74), nor is it "fixed in place" and "held in proper vertical position" by a "system of wedges," as provided in the patent. (Patent, p. 2, ll. 4-7.)

Claim 20. "The combination of * * *

Claim 20. "* * * rotary pump therein, and a line shaft for the pump * * *

The claim does not describe the shaft as sectional though a number of other claims stress this feature.

Not in claim 20.

Claim 20. "The combination of a well casing * * *."

If the well casing is to be considered as the means "through which the pumped water passes to the top of the well" then the

*Plaintiff's Counsels'
Conception.
(Continued.)*

*Claim 20 and the
Patent.
(Continued.)*

claim includes a water discharge casing. In such case the concentric wedges 62 must be used to make the platform 61 water-tight and prevent the water being pumped from flowing back into the well. (Patent, pp. 1, 2, ll. 129-4.)

If this be the meaning of the claim then the concentric wedges 62 are also the means whereby the line shaft is "entirely closed off from the water in the well," as distinguished from water being pumped, and the shaft casing is not included.

It should be noted in passing that the well casing is installed prior to assembly of the pump and hence is not part of the assembly "unit by unit" described by plaintiff's counsel, nor does it "hang pendant," but is the wall of the well.

Within this stationary well casing is inserted the well mechanism.

It is in no sense the equivalent of the modern concentric water discharge casing, which is not suggested by Layne's patent showing a *side water discharge*.

(4) "*A sectional shaft enclosing casing, extending from the pump casing to the top of the well and said shaft enclosing casing being adapted to:*" (Counsels' italics).

Claim 20. "and a line shaft for the pump entirely closed off from the water in the well."

The shaft casing is not mentioned in claim 20 but in 15 other claims all specifically using the word "casing," except claim 19 which speaks of it as a "closed pipe."

There was no necessity of reading the shaft casing into claim 20, especially as there are other means which might as well be considered as closing off the shaft from the water in the well, such as the side discharge casing in combination with the stuffing box at the top of the pump bowls, or the concentric wedges 62 made with overlapping sections in order to break the joints and make the platform 61 water-

Plaintiff's Counsels'
Conception.
(Continued.)

"(a) hold in *aline-*
ment the line shaft by
means of suitable
bearings within said
casing at appropriate
intervals:" (Counsel's
italics).

"(b) to *protect* the
line shaft and its bear-
ings from wear or in-
jury by any sand, grit
or other bearing de-
stroying detritus car-
ried by the water be-
ing pumped, and"
(Counsel's italics).

Claim 20 and the
Patent.
(Continued.)

tight within the casing
16. (Patent, pp. 2, 3,
ll. 124-4.)

Neither the word
"*alignment*" nor any
of its synonyms ap-
pear anywhere in the
patent.

The patent states:

"I provide a system
of wedges 33, which
serve to fix the pump
in place and hold it in
proper vertical po-
sition * * *." (Pat-
ent, p. 2, ll. 5-7.)

Bearings are not
mentioned in claim 20,
but are mentioned spe-
cifically in claims 10,
11, 13, 15, 16, 17, 18,
19 and 21.

Claim 20, "entirely
closed off from the
water in the well."

Claim 11 claims this
protective function for
the shaft casing read-
ing in part:

"A closed shaft cas-
ing protecting the
bearings from the
water."

Sand, grit and de-
tritus are not men-
tioned in the patent.

“(c) to form a *conduit for lubricant* from the top of the casing down through each succeeding bearing, including the lowest bearing, thus lubricating all the bearings *in series.*” (Counsels’ italics.)

The patent does not describe the casing as a “conduit,” but on the contrary specifies that it is a “chamber” nor is there any suggestion of lubricating the bearings in series, but on the contrary by a “chamber” “kept filled” with clean liquid, stagnantly held therein.

Lubrication of bearings appears in claim 19, reading:

“A pump shaft made in independently supported sections and suspended in a closed pipe and provided with bearings and means for lubricating same.”

Lubrication is not involved in claim 20, for it does not state any lubricating means as does claim 19 above quoted.

Elements Added by Plaintiff's Counsel, Not in Claim 20.

It will be seen from the above that plaintiff's counsels' conception includes the following elements not included either expressly or impliedly in claim 20.

- (1) Assembly means.
- (2) Suspension means.

(3) A water discharge sectional casing, unless the well casing 16 be so considered. In that case another element, not expressed, is required to make it operative, to-wit: the co-operating wedges of the modified form of structure;

(4) A sectional shaft enclosing casing, unless improperly read in as a means to make the line shaft "entirely closed off from the water in the well," which could not include any other function of said casing, the casing itself not being mentioned, and if improperly read in producing a mere purposeless aggregation.

(5) Bearings.

(6) Alignment.

(1) Assembly Means.

One of the objects of the patent is "to provide means by which the piping and pump may *all* be assembled in proper shape *before* inserting it into the well." [Patent, p. 1, ll. 12-15.]

This was accomplished by the wedge system.

"In order to *previously assemble all* the parts and then put the pump into the well and fix it in position therein, I provide a system of wedges, 33," etc. [Patent, p. 2, ll. 1-5.]

By supporting the weight of the shaft in sections, the pump shaft and shaft casing can be made in separable sections "and *the parts assembled before* putting them in the well." [Patent, p. 2, ll. 100-105.]

"The whole apparatus being *self-contained*, can be put together in proper form and lowered into the well *at once*." [Patent p. 3, ll. 66-69.]

Under the old pit pump system it was necessary for a man to go down into the pit to fix the pump in place. Layne conceived that he could obviate this by a system of wedges 33, "avoiding the necessity of a man's going into the well in order to fix the pump in place." [Patent, p. 2, ll. 8-10.] He also provided links, collars and rods 27 and 30, extending to the top of the well, "in order to manipulate it without going into the well." [Patent, p. 2, ll. 27-28.]

The unit by unit method of assemblage was not invented by Layne, but was originated before Layne by Byron Jackson.

In Byron Jackson's contract with Pabst for the installation of the 1903 Pabst pump is the following provision [Mead ex. 37, R., p. 147.]

"The said second party also agrees to furnish at his own expense a suitable derrick to place over the well at satisfactory height to raise each section of pump and pipe one over the other, each section not to exceed twenty (20) feet; requiring the top of the derrick to be, approximately, 40 feet high."

Alvord, who was also prior to Layne, used the unit by unit method of assemblage in connection with his aligning braces 16 (Fig. 1). [R., p. 930.] His shaft and shaft casing were made in sections. [R., p. 932, ll. 53-56.]

Both the El Campo and Getty mechanism were capable of assembly unit by unit. They were held not to infringe either claims 9 or 20. [195 Fed. 83, 262 Fed. 141.]

If the method of assembly is important in measuring Layne's conception, then the wedges, and the thrust bearings sectionally supporting the weight of the shaft, should be given due consideration.

Layne's system was not a unit by unit method of assembly, but assembly of all the parts before inserting into the well. In order to previously assemble in proper form and put into the well at once, he provided his system of wedges.

There is nothing in the patent, and particularly nothing in the claims in suit which suggests such a unit by unit method of assembly.

(2) Suspension Means.

Claim 20 does not include suspension means from the top of the well, though such means are expressly covered by rejected claims 1, 2 and 21 of the patent, and in present claim 18, which reads:

"18. In well apparatus the combination with a pump and *means for suspending it from the top of the well*, of a casing separating the pump and bearings from the well, and devices for fixing it at any desired point in the well casing, and means for operating the fixing devices from the top of the well." [R., p. 1005.]

Here is the idea of suspension and wedges combined. So also in the rejected claims, suspension means and wedges are combined.

Layne's attorney in writing the patent examiner, explained this idea as follows:

(P. 981) "The patent to Crannell not only shows a pump which cannot be *fixed at any desired point in the well* and which does not operate directly upon the water to raise it through an independent shaft (the side discharge casing 23), * * *"

* * * * *

(P. 983) "In fact none of the references show a closed driving shaft casing which extends to the top of the well from the pump and means to fix the pump in the well casing. THESE TWO FEATURES ARE NECESSARILY COMBINED because the essential thing of the invention is the drawing up of the water from below the pump and discharging it through an outlet (the side discharge casing 23) which is independent from the casing enclosing the bearings, whereby the bearings are entirely protected from the flowing water." (Small caps, parenthesis and italics ours.) [R. 981, 983.]

Layne's wedge system was intended to replace the well bottom of the pit pump as the support for pump.—What Layne did was to devise a system of wedges to fix the pump in place and hold it in proper vertical position, designed to be operated from the top of the well. Thus he planned to support in a driven well a pit pump, not of the old type with bearings on a framework, but of the Crannell type, which had a closed shaft casing.

Layne's main idea is thus expressed in the patent:

"My invention relates to the apparatus used for drawing water from driven or Artesian wells, and particularly to the *means for adjusting a pump therein*." [Patent, p. 1, ll. 8-12.]

This was accomplished by his

"system of wedges 33, which serve to fix the pump in place and hold it in proper vertical position, designed to be operated from the top of the well * * *." [Patent, p. 2, ll. 4-8.]

By operation of the collars and links, he thought wedge blocks 35 might be made

"to press with great power against the wedges 33, and thus fix the pump casing in place wherever desired." [Patent, p. 2, ll. 32-35.]

"The wedge system illustrated for tightening the pump casing in place may also, if desired, be used to center it with respect to the casing." [Patent, p. 2, ll. 105-108.]

In figures 10 to 13 the patent shows

"a modified form of apparatus which uses a simple series of wedges for fixing the pump in place, as illustrated best in figure 11." [Patent, p. 2, ll. 113-115.]

About two-thirds of Layne's stated objects and half his claims are to cover the wedge system.

Layne's mechanism is designed to be raised or lowered and held in proper vertical position by the wedges. [Patent, p. 2, ll. 1-10.]

The wedges automatically center the pump, though they may be manually operated.

"It will be seen also that the toggle levers used for actuating the wedges may be used

or not, as desired since the wedges alone will be amply sufficient in the apparatus of figure 1, as well as that of figure 10." [Patent, p. 3, ll. 69-73.]

The District Court in the instant case says:

"The problem of the inventor was not a new type of pump or pump runner, but, broadly speaking, how to install an existing rotary type—preferably centrifugal—operate it, withdraw it for repairs, and replace it *without the necessity of a man entering the well.*" [R. 889.]

The patent gives the solution—by a system of wedges 33,

"designed to be operated from the top of the well, *avoiding the necessity of a man's going into the well* in order to fix the pump in place." [Patent, p. 2, ll. 7-10.]

Plaintiff's counsel have asked: "How could he construct and assemble on the ground a pump structure of the necessary great length " etc.

The patent answers:

"In order to previously assemble all the parts and then put the pump into the well and fix it in position therein, I provide a system of wedges 33," etc. [Patent, p. 2, ll. 1-5.]

As stated above, about two-thirds the stated objects and half of the claims of the patent are to cover the wedge system.

Only one stated object refers to the shaft casing.

"to provide for mounting the pump and shaft in a closed casing open to operate from the top." [Patent, p. 1, ll. 38-41.]

This evidently refers to the blocks in the shaft casing supporting the shaft in sections with pump attached to the lower section, the casing being open at the top to insert hollow rod 44 to operate the means for tightening the packing in stuffing box 40, and pipe 52 to force in air to force out fluid.

Chiefly, the objects of the patent are adjustment, fixation, and centering obtained by the wedge system.

The Main Idea of the Patent Is Adjustment by Wedges in a Driven or Artesian Well of a Pump Therein.

The shaft casing was attached to the pump casing. Inside the shaft casing at the end of each section were bearing blocks to support the various sections of shaft, with pump impellers attached to the lowest section. On the outside of the shaft casing were collars attached to rods to operate the wedges attached to the pump casing below. Then the whole apparatus, thus self contained, was lowered into the well at once, adjusted, centered and fixed therein by the wedge system.

The wedge system is the essence of Layne's invention.

Claim 1, 2, 3, 4, 5, 6, 7, 8, 12, 18, 21 and 22 and original claims 1, 2, 9, 21 and 24 all contain wedges as an element. Of these seventeen claims including wedges, twelve are of the

twenty-two allowed. The other claims cover details of the construction used with the wedge system.

Layne's Modified Form of Structure shows that the wedge system was Layne's main idea. Figs. 10-13, inclusive, illustrate a different *wedging system*, concentric annular wedges.

The patent itself so states:

"In figures 10 to 13 I have shown a modified form of the apparatus which uses a simple series of wedges for fixing the pump in place, as illustrated best in Figure 11." [Patent, p. 2, ll. 112-115.]

Fig. 10 shows a short section of shaft casing 60, terminating below the pit at 68. From the drawing the timber 56 is not distinguishable from the shaft casing 60; but by reference to fig. 13 it is shown that shaft casing 60 terminates at 68, and above that figure is the timber 56, so marked in fig. 10. This old-style framework suspends the shaft and shaft casing in the well, supported additionally at the bottom by the annular wedges.

Shaft casing 60 is closed at the top with stuffing box 71, but no opening is shown for lubrication, and no means of lubrication is apparent. Evidently water lubrication from below was intended.

Only one length of discharge pipe is indicated, and only one length of shaft. We are left to imagine upper bearings attached to the timber 56, to keep the shaft in alignment above

the casing 60, between stuffing box 71 and the pulley head.

Preferred and Modified Forms Compared.—

Concerning the modified form of structure, the specification of the patent contains the following language:

"In general I prefer the form of apparatus as shown in Figure 1, both because the means for fixing the pump in place is more easily adjusted, and because of the superior mounting of the pump shaft inside its sectional casing as therein shown, and making the pump shaft in sections. But in cases where the pump will not be moved for a long time, the device of Figure 11 may be used for wedging it in place." [Patent, p. 3, ll. 50-60.]

Analyzing this statement, it appears that the "means for fixing the pump in place," to-wit: the wedges, as shown for the more approved form of apparatus shown in fig. 1, "are more easily adjusted" because of the sliding collars and toggle mechanism, while in the other form of construction the "screws 65 may be operated by means of a socket wrench placed upon a long rod, * * * or may be extended to the surface of the ground * * *." [Patent, p. 3, ll. 9-14.]

The statement as to the "superior mounting of the pump shaft inside its sectional casing as therein shown" evidently refers to the thrust bearings. The only bearing described in the modified form of structure is one, not for the

shaft, but for the shaft casing where the statement appears:

"Extending downward from the beam 57 may be provided a timber 56, and part way down a bearing and support provided for the casing of the pump shaft 60, by means of the block 67, which is carried on a cross frame 68; and a packing box therein, 71, is closed by a screw 70, the whole being attached to the timber 56 as shown in Figure 13. Below this point the shaft 39 may be inclosed in the casing 60, which is screwed in the block 67, as shown in said Figure." [Patent, p. 3, ll. 19-28.]

According to the statement under analysis, the phrase, "and making the pump shaft in sections," is intended for the preferred form of construction, but not for the modified form.

As no bearings are shown in the modified form of structure and as there is no provision that the pump shaft is to be made in sections, though "the casing 60 may be in sections and of any desired length" [Patent, p. 3, ll. 32-33] and, further, as no very long rod with socket wrench could be used to tighten screw 65, the evident intent of the modified form of structure is for a shallow well with one length of shafting and no bearings within the shaft casing.

The only purpose of the modified form of structure was, therefore, to show for the ever-essential wedging system a different form of wedging than that used in the preferred form of structure.

The concentric annular wedges of the modified form of structure have, however, an additional function to that of those shown in the preferred form. These wedges were designed to make pump casing 21 and platform casing 61 water-tight within the well casing 16, and by this means the well casing itself could be used as the conveying channel for the water, and the pump would then deliver directly into the upper casing. [See Patent, pp. 2, 3, ll. 124-4.]

This modified form of structure in figs. 10-13 embraces Layne's main conception as disclosed in the patent of a *wedge-adjusted* closed shaft casing *pit* pump, but does not embody the elements and features claimed by plaintiff to be embraced in Layne's alleged generic invention.

No *lubrication* means are indicated.

No *shaft bearings* within the casing for alignment are shown, but the old *pit* pump method of *alignment* by means of beams and framework is used.

No *protection* means are shown.

There is no block and strap arrangement binding discharge pipe 23 and shaft casing 60 together, but the discharge pipe is attached to the framework of timber 56 by strap 69 attaching block 67 to timber 56. [Patent, p. 3, ll. 29-32.]

Evidently the only purpose of the modified form of structure was to emphasize Layne's

main idea—his *wedging* system, in such a particular form as also to entirely close off the line shaft above the wedges from the water in the well. This function is expressed in claim 20.

In Layne's structure, suspension required *wedges*.

One reason why the suspension of a well mechanism in a deep well was considered by Layne to require the use of wedges to hold the pump in proper vertical position was because the casing of a deep well of that period was usually slightly crooked or sinuous. This is the reason why Alvord devised his means for aligning, as he stated in patent (prior to Layne) 735,690, page 1, lines 18 *et seq.* [R. 932.]

The principal reason for wedges, however, was that, with the discharge pipe on one side, the weight is not then equally distributed and it would be absolutely necessary for the pump to have further bracing. The pump could not hang freely within the well casing unless the water were to discharge directly into the center around the shaft and thus balance the contrivance.

The correspondence between Peden Iron and Steel Co. (with which Mr. Layne was associated at the time), and Byron Jackson Machine Works shows the state of the art when Layne filed his patent application.

In a letter from Peden Iron & Steel Co. to Byron Jackson Machine Works, dated March 7, 1903, appears the following * * * [R. 873]:

"We herewith inclose a sketch showing, in our opinion, what might be possible in the way of designing a top discharge for a centrifugal pump. In this sketch you will notice that we have an under suction and a top discharge; the propellor discharges into an opening directly over same and *conveys to one side* [R. 874] *of the shaft to discharge pipe* in place of following around the pump and discharging in the usual manner on the side. * * *

In your judgment would we need further stay the pump in the pit other than by being braced to the shaft and post suspending the pump?"

On April 2, 1903, Byron Jackson Machine Works wrote to Peden Iron & Steel Company as follows [R. 877]:

"We hand you herewith sketch showing an 8" vertical pump with 18" runner which we think will just fill your requirements. You will notice that we have split the discharge end in two. We did this in order to hang the pump centrally, *so it will not require any further bracing which would be absolutely necessary if the discharge were on one side as the weight is then not equally distributed.* The pump as we have shown it is intended to be lowered into a pit and it can be hung on the two pipes."

Suspending a closed shaft casing *with wedges* is no advance over the prior art because admittedly without utility. It was never used.

It is significant that the patent itself does not mention free suspension or pendency like a plumb bob. Suspension means are mentioned in only one claim, and then in connection with the *wedges*. Three other claims mentioning this feature were rejected, and that rejection acquiesced in. They also included *wedges*.

None of the claims in suit include or involve free suspension as did the earlier 1902 Byron Jackson structure.

In the Ninth Circuit Court of Appeals opinion the court says (p. 468):

"In claim 18 the combination includes 'a pump and means for suspending it from the top of the well.' The plaintiff claims that by this suspension the pump hangs pendant from the top of the well like a plumb bob in the well cavity, and that the shaft casing will also so hang and thus hold in alignment the shaft bearings mounted within the casing, and thereby maintain the shaft in alignment. But we do not find any claim for this suspended structure either in claim 9, 13 or 20, and there is no charge that claim 18 has been infringed."

(P. 469):

"This means for suspending the mechanism is to operate on the shaft casing and not the shaft casing upon the means of suspension, and this suspending device for alignment provided for in claim 18 is no part of this controversy."

Western Well Works v. Layne & Bowler Co., 276 Fed. 468, 469.

(3) Water Discharge Sectional Casing.

A concentric discharge casing independent of the well casing is not contained in claim 20. It is not in the patent at all. It is the structure invented by Byron Jackson and adopted by the art, including Layne.

(4) A Sectional Shaft-enclosing Casing.

This is another element that has erroneously been read into claim 20. Plaintiff's counsel are, however, justified by the prior adjudications in reading this element into the claim. This error may now be corrected as the prior adjudications are before this court for review.

Claim 20 describes the shaft as "entirely closed off from the water in the well." This might have been accomplished (1) by the concentric wedge 62, as we have above shown, or it might have been (2) by reason of the use of a side discharge pipe and a stuffing box at the top of the pump bowls, or it might have been (2) by the shaft casing, or it might have been (4) by all these elements in combination.

In view of the specifications we urge that the claim is too indefinite, too ambiguous to be sustained.

In *Hjarne v. American Voting Mach. Co.* (D. C. Mass. 1914), 212 Fed. 439, the claim related to key spindles and the means for regulating or controlling their rotation in a voting machine. The court held the claim fatally de-

fective for indefiniteness because of the difficulty of determining from the claim which of the things mentioned as elements of the combination claimed were intended to be described as permitting the key-spindle to be turned back at any time before the machine was set for the next voter.

See also:

In re Blackmore, 32 App. Cas. (D. C.) 338.

(5) Bearings.

Claim 20 does not mention intermediate or any bearings nor their function—alignment. Bearings are not included either expressly or by implication.

An examination of the specification shows bearings inserted as blocks supporting thrust collars, at the end of each section of shaft casing, as expressed in claims 10, 13, 15 and 17, but not in claim 20.

These bearings consist of two parts, a bearing block 47' which contains an opening serving as a sleeve for the shaft, and above and resting on this block is a collar for the shaft, the thrust collar being designated as 48'. This thrust collar 48' caps the slight annular space between the shaft and the sleeve bearing, thus stopping the oil working down and holding it in a chamber.

The main function of these bearings is to support the weight of the shaft in sections.

(Patent p. 2, ll. 49-57.) This feature is expressed in claims 3, 10, 15, 16 and 17.

These bearings are held in place by the shaft casing, which in turn is fixed and held in proper vertical position by "a system of wedges 33" (Patent p. 2, ll. 5-7) and also "mounted by a modified method on a series of co-operating concentric wedges, as shown in Fig. 11." (Patent p. 1, ll. 72-74.)

If the wedges in Layne's construction, as described and illustrated in his patent, were removed the shaft casing would not only be thrown off balance by the side discharge pipe and the side thrust of the water but would also whip with the motion of the revolving shaft.

The bearings would not align the shaft unless themselves held firmly in place. If the shaft casing did not align the bearings then the bearings in turn would not align the shaft and the shaft casing would not have the function of alignment.

(6) Alignment.

Layne did not conceive that the shaft casing by itself would be sufficient to align the shaft or bearings, without the aid of wedges to hold the casing itself in vertical position.

The specification above mentioned speaks of the wedges as serving "to keep the pump in place and hold it in proper vertical position." (Patent p. 2, ll. 5-7.) They may also be used to center it. (Patent p. 2, ll. 105-108.)

The shaft casing in combination with the wedges is specifically mentioned in claims 1, 2, 4, 5, 12, 21 and 22.

The patent shows that the shaft casing, by itself, is not a means of alignment by its suspension. Wedges are required.

The only claims suggesting suspension of the pump from the top of the well are rejected claims 1, 2 and 21, and present claim 18, and these claims all specifically mention the wedge as an element.

An analysis of the claims does not show a single claim with the shaft casing in a combination where without wedges it would be used for suspending the pump from the top of the well. The same is true of the specification.

Layne did not plan his shaft casing to be self-aligning. He conceived that an additional means would be required to center and fix it within the well casing, and hold it in vertical position. These were the functions of his wedges.

The Van Ness and Getty decisions went too far in their endeavor to support the patent, in stating that Layne's casing had the function of alignment. They did not make any mistake in holding that a shaft casing without the aligning feature was not novel, but in holding that Layne had such a shaft casing. Layne did not conceive, describe or claim it.

In the Getty case the court recognized the part of the wedges in alignment, saying:

“He accomplished its (the shaft’s) adjustment to vertical position in the well hole by suspending the shaft, pump and casing from the top of the well, and by a system of wedges holding the well mechanism in vertical position when adjusted.”

Getty v. Layne (C. C. A. 5th Cir.) 262 Fed. 142.

In Layne’s preferred form of structure with the side discharge pipe, *wedges* 33 are used to hold the well mechanism in vertical position when adjusted. But in the modified form, where the specification suggests that the discharge pipe may be dispensed with, and the well casing used as a water outlet, the aligning means are the timber 56, suspending shaft casing 60, and the *annular wedges* centering and fixing it in vertical position.

No intermediate shaft bearings appear in the modified form of structure, and the shaft casing in the modified form could not have any alignment function.

The case of *Wells v. Curtis* (6th Cir.), 66 Fed. 318, is one which parallels this case very closely in that, there as here, the function of alignment for a shaft casing, was urged as a new and useful result to distinguish the patent from the prior art, and that, there as here, the modified form does not show this feature of the combination.

The court said (p. 321):

"The advantage claimed for the Forbes patent is that the cylindrical casing performs the function in the combination of furnishing a bearing for the die-carrying ring, and thereby more rigidly holding the die ring to a right line in its forward movement upon the material on which it operates. * * * The *casing in which the shaft* of the ring turned was sufficient, to some extent at least, to hold the die-carrying ring in *alignment* with the object to be threaded, and resist any lateral thrust or twist of the parts from their *alignment* during the operation. The Heap machine included all the elements of the Forbes combination, unless it be that the casing in the latter performed a new function.

Much is said in the testimony and in the briefs of the casing as circumferentially journaling the die ring, and thus contributing an additional function to the combination. But it is difficult to find any indication in the claim, as explained by the specifications, of the discovery of anything new or peculiar in that direction, *or that the patentee intended the casing to perform any such function*. And while it is true that the patentee is not required to point out and describe in express language what he has invented that is (p. 322) new, or the principle of his invention, and that it is sufficient if they can be gathered by implication from what is set forth, yet the implication ought to be clear, so that it may not be left in obscurity and doubt whether the patentee has in reality invented and produced something new. * * *

"In his specifications Forbes says nothing of journaling his die-carrying ring by the casing, which seems singular if he had

such an idea in his mind, for confessedly it was the only new thing in his invention, as he now claims it. * * * If the idea of furnishing a circumferential journal to the die-carrying ring was not present to his mind, but is an after thought perceived from subsequent experience or scientific inspection and analysis, it is obvious that *there was no invention in this by accident, as it were, supplying the means of a function not contemplated.* * * * (P. 323.) But in another part of his specifications, suggesting a modification thereof, he entirely dispenses with this feature of his combination, and transfers it to the inside of the ring and the outside of the sleeve projected from the casing; thus showing that the bringing of the ring and casing in contact was useful in one only of the forms suggested, and therefore not an essential feature. *Trimmer Co. v. Stevens*, 137 U. S. 423, 11 Sup. Ct. 150.

* * * * *

“But assuming this function to have been contemplated, it seems difficult to hold that, in view of the prior inventions and constructions in this art, there was any such invention in the provision of this casing as a bearing for the die-carrying ring and its shaft (for that is what the prolongation of the ring really is) as to be worthy to be put upon the plane of new and valuable discoveries, recognized by the patent law.

* * * * *

“But, if any defect of that kind existed, it would seem that any skilled mechanic trained in the art of such mechanism ought promptly to have seen the manifest ways for providing a remedy; that is, by making the shaft longer, by making it larger, or, *providing a rest or bearing* for the other

end of the shaft or of the integral member of which it formed a part, and, *if a bearing, that it should be circumferential, in order to meet the indicated requirements.* It is elementary in the law upon this subject that this is not invention."

Wells v. Curtis, 66 Fed. 321, 322, 323.

The latter part of the above quotation seems very much like the language of Judge Jack, the district judge who tried the case of *Layne v. Getty*, where he said:

"The insertion of additional bearings to prevent whipping of the shaft where the distance between bearings is too great, is as simple and natural a thing to do as the putting in a fence of extra posts to prevent sagging of a barber wire, where the posts of the panels are too far apart. Were the question a new one, I should be inclined to hold the patent invalid, * * *" [R. 1011.]

With other means essential to align the shaft casing, such as the timber and annular wedges in figures 10-13, or the wedges 33 in the preferred form of structure, the shaft casing does not have the function of alignment.

The *Van Ness* case sustained claim 20, as covering a shaft casing with a *triple function*, attributing to the "protective casing" the additional functions of lubrication and alignment.

The *Getty* case sustained the claim as thus restricted, though in the *Getty* case the court, realizing that claim 20 did not use the terms "closed casing" or "protective casing," or their

equivalent, no longer uses these expressions, but calls it a "closed shaft."

The function of lubrication is one that the specifications describe for a "closed casing."

But neither specifications, drawings nor claims show a shaft casing with the third function called for by the Van Ness case:

"(3) to align the bearings and the shaft so as to prevent lateral displacement in the well and *keep the shaft in vertical position.*" (213 Fed. 808.)

The patent states:

"I provide a system of wedges 33, which serve to fix the pump in place and *hold it in proper vertical position * * **" (P. 2, ll. 5-7.)

Electric Storage Battery Co. v. Gould Storage Battery Co., (2nd Cir.), 158 Fed. 617.

Where a "change or function (alignment) is neither described nor claimed, and especially, where other changes (the wedges, sliding collars, rods and links) are described and insisted upon as essential and specifically claimed, it is significant proof that the change which has not been disclosed by him to the public is not his invention." (Our parentheses.)

In *Union Edge Setter Co. v. Keith*, 139 U. S. 530, 11 Sup. Ct. 621, 35 L. Ed. 264, the court said:

"If any separate function had been performed by this combination, it is somewhat singular that the patentee did not call attention to it in his original application, or

until after the main feature of his patent was shown to have been anticipated."

In *Stirling v. Rust Boiler Co.*, 144 Fed. 849, 852, the court said (p. 849):

"The first and primary duty of a court is to examine the patent and see whether its statements are in themselves plain and self-explanatory, and to resort to extrinsic aid only where it is required to aid in construing it by making plain something not in itself clear and intelligible. Let us therefore turn to the patent itself."

(P. 852):

"If the gist of this invention is the function of those tubes the patentee was singularly successful in ignoring it in his specification, for the only reference to it is where he says, 'the secondary elevated water drum is connected with one of the lower mud drums, preferably the middle one, by means of a series of tubes, etc.' Such omission is not without significance, for, as was said in *MacColl v. Knowles Loom Works*, 95 Fed. 986, 37 C. C. A. 350:

"In the construction of a patent, the omission of the patentee to point out or refer in his specification or claims to the special feature which he subsequently maintains is the most important part of his invention is very significant, and should be carefully scrutinized. 'If this feature be an advantage, as now claimed, it is strange that no allusion is made to it in the specification.'" *Fastner Co. v. Kraetzer*, 150 U. S. 111, 14 Sup. Ct. 48, 37 L. Ed. 1019."

In *Bates Machine Co. v. Wm. A. Force & Co.* (2nd Cir.), 149 Fed. 221, the court said:

"It is true that a patentee is entitled to all the beneficial uses of his real invention whether stated or not. But the fact that this patentee, while enumerating in his specifications some 12 advantages resulting from his improved construction, has not even hinted at or suggested any resulting capacity for vertical removal of the plunger, is very persuasive that this element, instead of being 'the aim and purpose of the invention' of the patentee is rather the discovery of his expert."

As to undisclosed function see also:

Goodyear Tire & Rubber Co., et al. v. Rubber Tire Wheel Co. (6th Cir.),
116 Fed. 363, 375, 376.

There has been erroneously read into claim 20 the shaft casing as the means of entirely closing off the shaft from the water in the well. In the Fifth Circuit the Circuit Court of Appeals then proceeded to discuss the novelty of the shaft casing as a separate element of the claim and held that the shaft casing with three functions is a novelty, and claim 20 therefore sustainable. Thus both structure and function were read into the claim. This was clear error.

The Supreme Court so holds in *McCarty v. Lchigh Valley Railroad Co.* (160 U. S. 110, 16 Sup. Ct. 240, 40 L. Ed. 358 at page 361) where the court said:

"It is suggested, however, that this feature may be read into the claims for the

purpose of sustaining the patent. While this may be done with a view of showing the connection in which a device is used, and proving that it is an operative device, we know of no principle of law which would authorize us to read into a claim an element which is not present, for the purpose of making out a case of novelty or infringement. The difficulty is that if we once begin to include elements not mentioned in the claim in order to limit such claim and avoid a defense of anticipation, we should never know where to stop. If, for example, a prior device were produced exhibiting the combination of these claims *plus* the springs, the patentee might insist upon reading some other element into the claims, such, for instance, as the side frames and all the other operative portions of the mechanism constituting the car truck, to prove that the prior device was not an anticipation. It might also require us to read into the fourth claim the flanges and pillars described in the third. This doctrine is too obviously untenable to require argument."

There is not a thing in claim 20 which would produce alignment, *because the casing surrounding the shaft could not produce alignment without bearings and wedges and bearings and wedges are not mentioned*. In order to support that patent, it was necessary to read into the claim something that was not there. The court cannot read a function into a claim for any other reason than to sustain its validity, and that that cannot be done unless the element or part as to which that function pertains is specified in that claim.

Plaintiffs are attempting to construe this patent as covering a result—covering a function, covering an object attained. Claims are not for those things. Claims are for structure and the structure is not in claim 20.

It is remarkable that after reading in the means for the *function*, the “shaft casing” for the “entirely closed off from the water in the well,” that the court in the Fifth Circuit expanded the one function into three.

If a shaft “entirely closed off from the water in the well” means one enclosed in a shaft casing which would exclude the water, that does not necessarily or even probably mean that said shaft casing will have any other function than the one of which expression is made. The claim cannot go beyond the function stated, because there is no structure stated which could support any other function.

There is no mention of anything like alignment in the specifications except in connection with the wedges where the specification reads:

“I provide a system of wedges 33 which serve to keep the pump in place and hold it in proper vertical position, * * *” (Patent p. 2, ll. 4-7.)

A third function *alignment*, was read into claim 20 by the Fifth Circuit to sustain it when such function is shown by the patent to be dependent on elements not present in the claim, to-wit, wedges and bearings.

In the Ninth Circuit Court of Appeals opinion the court said (p. 468):

"In the specification we find that one of the functions claimed for this casing is to protect the shaft and its bearings from the water and sand pumped to the surface. Another function claimed is to inclose the means provided for the lubrication of the shaft bearings, but further than this the specification does not go."

(P. 469):

"It seems clear to us that the alignment is not a function of the shaft casing, * * * we are of the opinion that alignment is not a function of any of the elements of either of the claims under consideration."

Western Well Works v. Layne & Bowler Co., 276 Fed. pp. 468, 469.

Functionalism of Claim 20 as Construed by Fifth Circuit.

Claim 20 was construed by the Fifth Circuit to include the shaft casing as a means to entirely close off the shaft from the water in the well. In addition to reading in the shaft casing the court added another element, not expressed, intermediate bearings for the shaft. The modified form contains no suggestion of such bearings. A shaft "entirely closed off from the water in the well" does not, by reason thereof, have intermediate bearings to support it. But the court, to find novelty in the claim, added these bearings to it so that the shaft casing might have the function of align-

ment in addition to the functions of protection and lubrication contained in shaft casings of the prior art, Crannell and others.

This reading in of elements and the function of alignment ignored the silence of the patent on the subject of alignment and the statement that his system of *wedges* was designed to hold the mechanism "in proper vertical position." (Patent p. 2, l. 6.)

To read in function without regard to the means of performing such function is to make the claim functional and void.

Queen & Co. v. R. Friedlander & Co.,
149 Fed. 771, 777.

"Manifestly he seeks to cover more than is suggested in his specification and drawings. In the language of *Carlton v. Bokee*, 17 Wall. 463, 21 L. Ed. 517, he is making 'ingenious attempts to expand a simple invention of a distinct device into an all-embracing claim, calculated by its wide generalizations and ambiguous language to discourage further invention in the same department of industry. * * *' This he cannot do. Claim 1 is therefore held void."

Cornung v. Burden, 15 How. 252, 14 L. Ed. 683, 691.

"He cannot describe a machine and then claim the function itself and all other machines that perform the function."

VII.

THE PATENT'S "ENTIRELY CLOSED CASING."

The Particular Element in Controversy—The Closed Casing.

The claims in controversy, 9, 13 and 20, are combination claims, but the particular element in these combinations which plaintiff desires to exclude others from using is the pipe or tube surrounding the shaft of a rotary pump for water wells. As above stated, it is not expressed in claim 20 but has been read into it.

It is called a "shaft casing" because it encloses or encloses the driving shaft. It is sometimes called an "oil tube" or "oil pipe" because its main function is to hold the oil which lubricates the bearings for the shaft within.

In the patent it is described as an "air-tight chamber" which may be "kept filled with clean liquid" for a "lubricating system." (Patent p. 3, ll. 78-82.) It extends from the pump underground, to the top of the well.

The other elements of the claims limit the combinations in which plaintiff claims the particular kind of shaft casing and its "chamber" purported to be devised by him. The extent to which he may exclude others, if at all, depends upon what advance, if any, he made on the prior art.

Beginning 13 years prior to Layne's filing date, April 29, 1903, there were, with closed shaft casings: The 1890 Crannell patent [R. 1022]; the 1890 *Byron Jackson patent* (Getty Record); the 1894 Eisler patent [R. 1018]; the 1900 Prindle Orpheum Theatre pump installed in Brooklyn, N. Y. (Getty Record); the 1901 Gregory & Snyder pump installed in Louisiana (Getty Record); *the 1901 Byron Jackson's sludge pump* installed in San Francisco, California (a new defense herein) [R. 1114]; the 1901 drawings and disclosures of the Worthington deep well turbine pump distributed through the territory in which Mr. Layne was operating (Getty Record); *the March 5, 1902 blue print and disclosures of Byron Jackson for a three-step centrifugal pump to go in a 16" well 150 feet deep* (a new defense herein) [R. 1063]; the April 7-17, 1902 Alvord's drawings and disclosures incorporated in Alvord's patents Aug. 11, 1903 [R. 929 *et seq.*]; the E. M. Ivins patent of July 29, 1902 [R. 1057]; and (a new defense here) the various drawings and disclosures of early 1903 *of the Pabst pump of Byron Jackson* installed in the latter part of 1903, completed and operated Jan., 1904 and dating back as Byron Jackson's invention to March 5, 1902.

These prior art structures all had shaft casings more or less closed to protect the shaft and its bearings against water and detritus, and

serving as lubrication pipes surrounding said shaft and bearings. Necessarily they limit the scope of plaintiff's patent to the exact combinations disclosed in the patent.

In *Getty v. Layne* (5th Cir. C. C. A.) 262 Fed. 143, the court said as to Layne's patent:

"Its advance over Crannell (patent 1890, R. 1022) prevented Crannell being considered by us an anticipation, and was enough to show novelty, but it stops there. The Layne patent must rest, not upon the idea of closure, which would not be patentable apart from the method by which it was accomplished, but upon the *means* of its accomplishment, as disclosed by the specifications of his patent."

Turning to the patent we find as follows:

Specification.

ENCLOSING THE SHAFT.

"It (the pump) is attached to a casing 20, which runs to the top of the well and *encloses* the driving shaft 39 of the pump * * *" (Patent p. 1, ll. 100-103.)

"The pump shaft 39 is *enclosed* in a shaft casing 20, which latter is made in joints and may be of any desired length." (Patent p. 2, ll. 36-38.)

CLOSED AT THE TOP BY A STUFFING BOX 50.

"At the top, the casing 20 is *closed* and is provided with a *stuffing box 50*, *closed* by the cap 51, at the top of the shaft 39." (Patent p. 2, ll. 57-59.)

CLOSED AT THE BOTTOM BY PACKING BOX 40.

"The casing 20 also contains a tubular rod 44, which has a bearing in the block 47 on

top of the pump casing 37, as shown in Fig. 5, and is provided with a square opening which co-operates with the head of the screw 42, used for adjusting the cap 41 of the *packing box* 40 for the pump, and *compressing the packing* in place." (Patent p. 2, ll. 66-72.)

KEEPING THE BEARINGS CLEAN.

"This pipe or tubular shaft 44 also serves the purpose of providing convenient means for *forcing* the liquid out of the pump shaft casing. By *forcing* air in at the top of the casing 20, by means of the pipe 52, the liquid can be *forced* down to the bottom of said casing 20, and by means of the small opening 45, in the bottom of the tubular shaft 44, the fluid can be *forced* out at the top 54, and *keep the casing clear in order to leave the bearings clean therein* and not interfere with the working of the pump, or by *forcing* fluid in at the top 54, the operation will be reversed, and the fluid ejected from pipe 52." (Patent p. 2, ll. 83-96.)

CHAMBER LUBRICATING SYSTEM.

"I consider it of great advantage also to arrange the pump shaft in a *closed casing* with stuffing box at surface of ground at top of pump, so that by the use of the packing boxes an *air-tight chamber* can be maintained, and water kept out of the casing 20, or *kept filled* with clean liquid, if desired, thereby providing an efficient *lubricating system* for all bearings of the pump." (Patent p. 3, ll. 74-82.)

This last quoted portion of the specifications is the only place where lubrication is mentioned.

The above quotations contain almost, if not all, that the patent contains with reference to the shaft casing.

The language of the patent, the specifications and claims, and especially the claims in contro-

versy, all emphasize the intent to make a tight closure and justify the conclusions in both the Fifth and Ninth Circuit Courts of Appeals that in the Layne patent the shaft casing is *entirely* closed, that there is *complete* closure.

Adjudications.

The *Western Well Works* decision reads:

"The difference between the Layne patent and the Getty mechanism, as it appears in *Getty v. Layne*, *supra*, is essentially the difference between the Layne patent and the defendants' mechanism in this case. *In the Layne patent the shaft casing is entirely closed*, or that is the invention claimed in claim 20 and is necessarily the operative device of that claim and of claims 9 and 13, and by this device *the oil becomes stagnant* in the bearings and *is blown out* when sufficiently used or spent, while the defendants' shaft is not entirely closed, but permits the oil to circulate down through the bearings and out at the bottom while the pump is in operation." (276 Fed. at top of p. 472.)

Plaintiff's system of lubrication has been well characterized in the Getty case (5th C. C. A.) and the Western Well Works case (9th C. C. A.) as "*stagnant*."

The Layne lubrication system is like that of the crank case of an automobile from which fouled used oil is drained and fresh oil is put in.

There is no oil cup or oil feed indicated or mentioned in the Layne patent as there is in the 1894 Eisler patent, and in the 1890 Byron

Jackson patent where it is described as the part "M", and in the Byron Jackson drawings of 1903 for the Pabst pump.

In the Layne patent the lubricant is not *fed* in but *forced* in as the specifications state. (Patent p. 2, ll. 83-96, above quoted herein.) It then remains "stagnant within the shaft casing until ejected from the top after it had become spent * * *." (Getty case, 262 Fed. 143, Western Well Works case, 276 Fed., top p. 472.)

Plaintiff's specifications describe his closed casing as one which, by stuffing boxes, can be "kept filled with clean liquid, if desired, thereby providing an efficient lubricating system for all bearings of the pump." (Patent p. 3, ll. 79-82.)

As the Layne patent discloses no liquid supply, the closed casing can only be "kept filled" by retaining the fluid therein, that is, keeping it stagnant. If there were any circulation into the well the fluid would be depleted and the casing could not be said to be "kept filled."

So far as the patent discloses, the lubrication "liquid" may have been clean water. The words "oil" or "grease" are not used, merely "liquid."

Water and Wooden Bearing Blocks.—Alvord used water and *lignum vitae* bearings for the shaft. [R. p. 932, l. 67.]

Layne's drawings indicate wooden bearing blocks 47, 47'.

Whether water or other liquid were used, the chamber should be "kept filled" for the lubrication of the grinding thrust bearings.

We do not think that the lubricating system described in the patent is efficient or practicable, or that it could be made so without greater modification than is permitted in construing a patent, but we take it *as expressed*. Plaintiff changes the verbiage of the patent from "chamber" to "conduit" in order to present a different picture.

Layne's Closure Means Are Thrust Bearings and Stuffing Boxes and Sleeve Bearings, All Combined, With a Particular Mode of Operation.

Figures 7, 8 and 9 of the Layne patent give an interior view of the shaft casing with the top stuffing box 50 and the intermediate thrust bearing block 47' carrying the shaft coupling block 48', and figure 5 shows the lowermost thrust bearings 47 and 48, with the lower stuffing box 40, and a short sleeve bearing below.

It is by reason of these stuffing boxes at the top and bottom of the Layne shaft casing and the thrust bearings, and said sleeve bearings *combined* that Layne has an "entirely closed casing" "so that by the use of the packing boxes an air-tight chamber can be maintained,

and water kept out of the casing 20, or kept filled with clean liquid, if desired, * * *” (Patent p. 3, ll. 77, 78 above quoted.) Thus we see that tight stuffing boxes are essential, as well as the other means.

Layne's Lowest Thrust Bearing and Shaft Collar.

The lowest thrust bearing and shaft collar were present in the Van Ness structure which was held to infringe Layne's claim 20 in the case of *Van Ness v. Layne* (5th Cir. C. C. A.) 213 Fed. 804.

The Getty case speaks of this as follows:

“It is true that in the Van Ness case this court stated that Van Ness used the pressure of the oil column, and did not use packing boxes to effect closure. Van Ness, however, did suspend his well mechanism from the top of the well, and *did use thrust bearings and a collar* to help close the bottom of the shaft casing.” (262 Fed. 144.)

The lowest bearing in the Getty structure was a *sleeve* bearing only, *without the weighted collar*. It was not a *thrust* bearing. In the Getty case the structure was held not to be an infringement of claims 9 and 20, *Getty v. Layne* (5th Cir. C. C. A.), 262 Fed. 141.

Figure 5 of the patent shows the thrust collar 48 is not only weighted by the weight of the lower section 39 of the shaft but also by the weight of the heavy pump runner 38 at-

tached thereto (Patent p. 2, ll. 49-51) and when the pump is running there would be the added terrific thrust of the column of water being pumped.

If Layne's shaft casing were filled with oil, such oil could not flow downward out of the shaft casing, because the sleeve bearing in the thrust bearing block 47 is completely covered over and sealed by the heavily weighted collar 48.

To get through this grinding double bearing the oil must first pass, not downward but laterally, under the contact plane of the thrust collar 48, weighted by the weight of a shaft section, pump runners, and water being pumped, all heavily thrusting it down on the bearing block 47.

Any oil which might (theoretically) pass in a thin film under the tightly contacted planes of the rapidly revolving thrust collar on the thrust block, would then pass down through the sleeve in the block 47 where it would be further used, dissipated and spent with the thousand revolutions per minutes of the actuating shaft. No oil could pass through this double bearing. All lubricant working into the bearing would be used up therein, the thrust collar 48 forms a *complete seal* over the bearing block 47 on which it thrusts, just as the thrust collar in the infringing Van Ness structure did. Resting on the long brass bushing, it formed a mechanical

closure whether the pump was operating or at rest.

And then below this thrust bearing is the stuffing box 40 with its adjustable cap 41. The patent provides special tightening means for this stuffing box to jam the packing against the shaft. This tightening means is the tubular shaft 44 to operate on screw 42 with a sprocket chain 46 to turn other screws at the same time and thus press the cap down and tighten the packing. (Patent p. 2, ll. 66-82.) Below that is the short sleeve bearing above mentioned.

With all these closure means the specifications of the patent describe the closed casing as an "air-tight chamber" with "water kept out * * * kept filled with clean liquid." (Patent p. 3, ll. 79-82.)

These provisions are for a mechanical air-tight closure.

VIII.

BYRON JACKSON THE INVENTOR OF THE MODERN DEEP WELL PUMP AND ITS SHAFT CASING.

Byron Jackson was the inventor who developed the modern small bore deep well pump and adapted the shaft casing thereto for purposes not contemplated in the Layne patent.

Byron Jackson, and not Layne, is the one who conceived and diligently reduced to practical use the type of shaft casings now used

by manufacturers of centrifugal pumps in deep water wells.

**Byron Jackson's 1890 Patent Pump With
Shaft Casing.**

Byron Jackson had used shaft casings for many years for his pit pumps that were placed in large-sized well holes set on the bottom of the well with a side separate discharge pipe independent of the shaft casing. This is shown in his 1890 patent which had a shaft casing surrounding the shaft of a pit pump with a side or eccentric discharge casing corresponding to Layne's discharge casing No. 23. His patent is dated November 11, 1890, No. 440252.

In Byron Jackson's 1890 patent a small pipe connected the side discharge pipe with the shaft casing so as to inject therein a small stream of water for lubrication of the shaft bearings. Until the pump was well started there was an oil cup at the top, the part designated "M," to allow oil to descend into the casing by gravity and lubricate the shaft bearings below.

**Byron Jackson's 1901 Sludge Pump With
Shaft Casing With Intermediate Bearings.**

In 1901 Byron Jackson Machine Works constructed a sludge pump, the drawing of which appears R. 1114.

This exhibit, 1-C-66, dated May 6, 1901, was a drawing for a pump on an order from a hotel located in San Francisco.

Frank Jackson testified that it was destroyed in the San Francisco fire. [R. 464-465.]

This sludge pump was a modification of the construction shown in the 1890 patent, in two small, but important respects: (1) the connecting pipe between the discharge pipe and the shaft casing was done away with, leaving the oiling system as the sole lubrication means; (2) an intermediate shaft bearing within the shaft casing appears.

On account of the discharge of the water through a side discharge pipe in the old pit pump the weight was not distributed evenly and the side thrust of the water made it necessary to rest the pump on the bottom and brace it. Byron Jackson developed a center discharge.

Byron Jackson's 1900 Pump With Concentric Water Discharge Casing.

At the time of the construction of the sludge pump of 1901, Byron Jackson was already experimenting with a pump to discharge directly into the center instead of at one side, "the shaft running through the pipe, thus to be coupled up and hung in the well by the pipe, having no other framework." (Byron Jackson's letter Feb. 17, 1902, Mead Exhibit 2, R. 54.)

The pump mentioned in this letter was one to go in a 10" well. It is shown in drawings sent to Engineer Mead dated December 27, 1900, 1-D-14, Mead Exhibit 92 and 3-B-41,

Mead Exhibit 93. [R. 227-231.] There is no shaft casing in this pump but the discharge casing is concentric with the shaft which is supported at its lower end on a thrust ball bearing.

The ball bearing, however, was found to be a failure because running in the water it wore out, and Frank Jackson testifies that, after some discussion,

"then the suggestion came to Mr. Jackson or myself, I think perhaps at the same time, that we put a tube around the shaft and put oil into that tube and protect the bearing by that." [R. 395.]

Frank Jackson also testified:

"As soon as we conceived that idea (a tube to protect the bearings) Mr. Jackson says we will make a larger one. This pump is too small to get that tube in, and he ordered the drawings made for a larger size of that same type of pump, and then in order not to have the speed excessive, we made it, as I remember, with about three stages." [R. 396.]

The drawing for the larger size of the same type of pump in three stages, referred to by Frank Jackson in the quotation immediately above, is dated March 5, 1902. (Mead Exhibit 6, R. 1063.) It shows a *shaft casing within a suspended concentric water discharge casing*. This drawing is designated on its face, 1-C-75, general drawing of a 3½" vertical series centrifugal pump with three steps to go in a 16" casing well capacity from 500 to 800 G. P. M. (gallons per minute) head 150 ft. R. P. M.

(revolutions per minute) 1500 to 1800 D. C. (direct connected) 15 H. P. W. (horse power Westinghouse) motor.

Byron Jackson's 1902 Drawing With Concentric Water Discharge Casing and Inner Shaft Casing.

This drawing was sent to Engineer Mead in a letter dated March 31, 1902 (Mead Exhibit 5, R. 59, 74) with another drawing showing a double discharge pipe carrying the shaft in between. This was another construction for maintaining proper balance, and thus avoiding disturbance of balance by a single side discharge pipe.

We quote a portion of the letter as follows:

"SMALL PUMP IN WELL CASINGS—We have never taken the time to work this out carefully in full detail, but have done considerable sketching, and herewith enclose 2 of them,—*one where the shaft is in the discharge pipe; the other where the discharge pipe is made in two and the shaft is run between them. This pump has to be coupled together and dropped in the well and supported from the top.* We believe it is quite possible to work out an efficiency and satisfactory pump, and the cost would not be greater than any centrifugal pump for the same purpose, as all pumps have to have vertical shafting or connecting rods and discharge pipes; but it is special work, and we have not done enough of it to make an offhand estimate. As I wrote you before, *we made a 10" pump something on these lines*, but we used propeller blades for a runner instead of centrifugal pump runners and while our test pumped a large quan-

tity of water, we did not make a thorough test of efficiency, but we did enough of it so that we decided that the efficiency is not as good as the centrifugal runner and for this reason abandoned it; but we can just as well use the centrifugal runner which makes it but a trifle larger in diameter, but it gives us a much better opportunity to *balance the weight of the shaft*, and makes a more compact plant, besides we are dealing with something that we are continually having experience with, and can design a pump with some certainty as to its efficiency, capacity and *balancing power*. As soon as we get time, we propose to enter upon a thorough experimenting with pump and test. We propose to manufacture a pump and thoroughly test it, when we will be able to give you definite information.

* * * * *

Yours truly

BYRON JACKSON MACHINE WORKS,

Per

Byron Jackson."

[R. 62, 63, 64.]

All this is two months prior to Layne's earliest orally claimed conception date, May, 1902, and more than a year previous to his patent application filing date, April 28, 1903. His patent application is his earliest drawing proven, dated April 3, 1903. [R. 962.]

Layne devised a system of wedges to enable him to support the pump above the bottom of the well and balance or brace it against the side and down thrust of the side discharge of water.

Byron Jackson, however, designed his pump to discharge directly into the center, instead of

at one side, the shaft to run through the pipe, "thus to be coupled up and hung in the well by the pipe, having no other frame-work." (Jackson's Feb. 17, 1902 letter, Mead Ex. 2, R. 54.)

Using the concentric discharge casing brought the water up around the shaft to the detriment of the bearings and prevented oil lubrication unless protected in some manner. To furnish this protection and give a channel for the flow of the oil to the bearings Byron Jackson conceived the idea of putting an inner tube or shaft casing around the shaft and feeding his oil in at the top. This would protect the bearings and enable their lubrication by oil fed in and flowing down by gravity.

To hold the inner tube against whipping he first devised a crude form of spider which served a double purpose, constituting a bearing for the shaft and a coupling for the inner tube. A short time later this spider was developed so as to serve at its outer circumference as a coupling for the sections of the concentric discharge pipe and to hold the inner tube and shaft in alignment.

The shaft's weight was carried on a thrust bearing at the top of the well.

This was a total re-organization and produced a new entity not contemplated or suggested by the Layne patent but universally adopted in the art.

Jackson taught the practical art; Layne did not.

**Byron Jackson's 1903 Installed Pabst Pump
With Concentric Discharge Casing and
Inner Closed Shaft Casing With Inter-
mediate Bearings.**

The installation of the first pump embodying the concentric discharge casing with the inner shaft casing was in 1903.

On March 18, 1903, Mead wrote to Byron Jackson asking the price on a pump to be furnished to the Pabst Brewing Company of Milwaukee. [Mead ex. 8, R. 86, 87.] Byron Jackson wrote him in reply April 8, 1903, quoting a price of \$1500. [Mead ex. 12, R. 91-93.]

April 15, 1903, Engineer Mead wired Byron Jackson, offering \$2500 for the pump complete. [Mead ex., 15 R. 97.]

April 20, 1903, a contract was made up in triplicate specifying "The pump shaft to be enclosed in a pipe within a discharge pipe." [Mead, ex. 22, R. 111.]

April 29, 1903, Byron Jackson writes Engineer Mead, describing the Pabst pump and stating, "You will note that shafting is enclosed in 4" pipe and intended to be water and oil tight, oil fed in at the top letting it find its way through each bearing," etc. [Mead, ex. 44, R. 166.]

After some further negotiations on September 5, 1903, a new form of contract was executed between Byron Jackson and the Pabst Brewing Company for the installation of the pump. [Mead, ex. 37, R. 145.] In October,

1903, Mr. Robb, an employee of Byron Jackson, went to Milwaukee to install the pump [R. 406, 471, 158], and on January 12, 1904, the same was installed and working. [Mead, ex. 43, R. 159.] It successfully operated for months. [Mead, ex. 53, R. 180.]

Subsequent to the date of completion of the Pabst pump Layne's claim 20 was proposed to the patent office on January 30, 1904 [R. 980.]

Regarding this first pump Engineer Mead says:

"* * * But I have a very distinct recollection concerning the general features of this pump, because the pump was built at my request and in accordance with my suggestion, and *was the first pump of the kind that I ever know of being installed*, and I was very much impressed with the value of that kind of pump, and it left a very clear impression on me of the general outline of that pump. Now, as far as dimensions and all these things that constitute details are concerned, I confess that they are hazy. As I have said, I don't remember all these dimensions, *but as to the arrangement of discharge pipes, and of enclosed shafts, and the arrangement in general for separating the shaft from the discharged water, and to permit of the oiling of the interior bearings and keeping the water away from them*—those matters were impressed on me very, very distinctly by my study of the situation and my conversations and correspondence with Mr. Jackson. I believe I could swear to those as long as I live, because *it was the first pump of the kind* and I was very much interested in it, not only as an engineer, but as a development in the line of pumping machinery in which I was greatly interested." [R. 253-254.]

IX.

CONTRAST OF BYRON JACKSON'S INVENTION, THE MODERN PRACTICE, WITH THE LAYNE PATENT.

1. Center Discharge of the Water in Jackson's Mechanism and Side Discharge in Layne's Patent Disclosure.

When Byron Jackson began working on the problem of a "small pump in well casing" he first conceived of discharging his water in a column concentric with the shaft, discharging his pump "directly into the center" [R. 54], that is through a discharge pipe which likewise surrounded the pump shaft. This shaft thus was surrounded with water. When he tried his model for a 10" well he found it unsuccessful as to lubrication. There was what he describes later as difficulty in "oiling the shafting and friction of couplings in water." [R. 54.]

The suggestion then came to him to surround the shaft with a casing cutting off the discharging water from the shaft and when this was tried it was found successful and was used in the first pump of this type installed, the 1903 Pabst pump.

The old style pump discharged at one side and not into the center. The side discharge is the form illustrated in Layne's patent, figures 1 and 5 and 10 to 13 as well. Even where the

patent's suggestion for the modified form that the discharge pipe 23 may be omitted and the well casing itself act as a conveying channel the opening in the top of the pump casing is for discharging the water at one side. The concentric wedges used for that form would center and hold against the side thrust.

2. Support of Mechanism on the Concentric Discharge Casing by Byron Jackson, Mounted on Wedges by Layne.

Byron Jackson in adopting the idea of discharging directly into the center, "the shaft running through the pipe" perceived that his mechanism could "thus be coupled up and hung in the well by the pipe, having no other framework." [Letter, Feb. 17, 1902, Mead ex. 2, R. 54.]

In his letter of March 31, 1902 [Mead's ex. 5, R. 63] he also writes:

"This pump has to be coupled together and dropped in the well and supported from the top."

In the proposed Pabst contract of April 20, 1903 [Mead ex. 22, R. 111] it is provided:

"The pump to be suspended in the well by the discharge pipe."

In the executed Pabst contract, Sept. 5, 1903 [Mead ex. 37, R. 147] he provided:

"The pump to be suspended in the well by the discharge pipe attached to the cast iron pulley frame and discharge elbow."

Layne, however, using a side discharge casing must balance his mechanism either by resting on the bottom of the well or by means of bracing devices. His conception was his wedge system, of which were two forms, one in series, the other annular to make the platform 61 water-tight.

3. Shaft Weight Support on Ball Bearings in Pump Head by Jackson, Sectionally by the Shaft Casing, in Layne's Patent.

Byron Jackson with his concentric discharge casing needed, as he says in his letter of Feb. 17, 1902 [Mead ex. 2, R. 54] "no other frame work."

So also Layne in his preferred form of structure with his wedges needed no other frame work. The modified form has a frame work.

The specification reads:

"In the case illustrated, the top of the shaft may be provided with a pulley 25 as before, and a bearing fixed on some part of the frame work, on the cross beam 57. Extending downward from the beam 57 may be provided a timber 56, and part way down a bearing and support provided for the casing of the pump shaft 60, by means of the block 67, which is carried on a cross frame 68"; (Patent, p. 3, ll. 15-23).

Where the old frame work with its bearings and support for the shaft is eliminated some other means must be devised to carry the long heavy shaft.

Byron Jackson supported his shaft as a unit on a single thrust ball bearing at the top of the well.

In his letter of Mar. 31, 1902 [Mead ex. 5 R. 60] he says:

"The balance device can be arranged to carry almost any load except this one item, that a *thrust bearing or ball bearing* must be provided to carry the *total weight of shaft* and fittings while the pump is running empty."

In his letter of April 15, 1903, Mead ex. 21 [R. 107] he stated:

"I do not think, however, that it would be possible to make a complete balance of the shafting, but it would be approximate enough so that good ball bearing thrust collars will carry the end thrust of shaft either up or down."

In his letter of April 29, 1903 [Mead ex. 48, R. 167] he stated:

"The top bearing is provided with ball thrust bearings to carry the weight of the shaft when commencing to pump, and the shaft is intended to be automatically balanced.

"I specified in the specifications that it would be approximately balanced, but after making the drawing I believe it will float by the pressure of the discharge water and have no end thrust at all."

In his contract of Sept. 5, 1903 with Pabst [Mead ex. 37, R. 148-9] he provided:

"* * * the shaft will be partially and approximately balanced by the discharge pressure of water acting on the pump runners, and the unbalanced end thrust of shafting either up or down will be held in place by a suitable end thrust shaft bearing."

Layne's object, however, was, as expressed in his statement of objects, "to provide an extensible pump shaft *separately supported at intervals* along its length." (Patent, p. 1, ll. 35-37.) This he did by bearing blocks 47, 47', etc., at the end of each section of shaft supporting a section of shaft on the thrust collars 48, 48', etc. (Patent, p. 2, ll. 38-57, 97-100.)

The bearing blocks of the Layne patent are supported by the shaft casing. Thus the weight of the pump and shaft and the thrust of the pumped water is borne by the shaft casing mounted on the wedges.

This making of the shaft in sections "which are attached together by means of sliding keys so as to allow them some vertical play with relation to each other" (patent, p. 2, ll. 40-42), resembles the 1899 Northam patent which is described as coupled by universal joints consisting of knuckles secured by pins.

The Northam patent states:

"* * * the jointed pump-shaft being adapted for well casings that have become bent in driving * * *." [R. 1033, ll. 38-40.]

It may be that the construction of the shaft in sections "so as to allow some vertical play with relation to each other" should be considered as intended to correct errors in alignment in view of the Northam patent's disclosure. With this extensible pump shaft separately supported in sections the shaft casing might possibly not be absolutely in true alignment and yet

the wedges would center the pump casing and thus the bearing and stuffing box at the top thereof would put the shaft in proper vertical position and the play in the joints allow for irregularities in the line of the shaft casing.

Layne's shaft casing was not intended to prevent lateral movement or whipping of a shaft operating as a unit through the bearing because each section of his shaft was separately supported,—was an independent shaft between the bearings.

4. Protection of the Shaft and Bearings Without Bottom Thrust Bearing by Byron Jackson, With It by Layne.

Byron Jackson used stuffing boxes at the top and bottom of his shaft casing to close it against the entrance of water and thus protect his shaft and bearings. But he did not use a thrust collar to seal his lowest sleeve bearing for the shaft.

"Layne, according to the specifications of his patent, effected his closure at the top and bottom of his shaft by the presence of stuffing boxes, assisted by the effect of a downward thrust bearing and collar. In practice, Layne soon abandoned the use of packing boxes, substituting therefor a long sleeve bearing and retaining the collar. The downward thrust of the weight of the shaft and pump, together with the downward pressure of the column of oil in the shaft casing, accomplished his closure." *Getty v. Layne* (C. C. A., 5th Cir.) 262 Fed. 143.

The above quotation states that the closure is "assisted by the effect of a downward thrust bearing and collar." That refers to the thrust bearing shown in Fig. 5 where the collar seals the sleeve bearing and thrusts down and thus assists in excluding water from the chamber above.

5. Lubrication of Shaft and Bearings, Circulation of Oil by Byron Jackson, Stagnant by Layne.

Byron Jackson provided a circulatory lubricating passage through his shaft casing from top to the bottom where the unused oil passed into the well.

In his letter of April 29, 1903 [Mead ex. 44, R. 166] he stated:

"You will note that the shafting is inclosed in a 4" pipe and intended to be *water and oil tight*, and the oil fed in at the top, letting it find its way through each bearing and down the pipe to the pump, where there is arranged suitable drain pipes to permit the water to drain out of the pipe what leaks through the last bearing of the pump where the waste oil will also get out and be pumped through the water, which I presume some people will object to, but, as you know, it is a very homeopathic quantity and does no harm."

In a letter regarding the Geneva pump of the same type [Mead ex. 46, R. 169-170], dated July 7, 1903, he stated:

"* * * the oil in the pump bearings being led to them from the top by a pipe while the shaft bearings are oiled simply by the waste

oil dropping from one bearing to another inside of the 4" pipe."

In the contract of September 5, 1903, with Pabst [Mead ex. 37, R. 146-147] Byron Jackson provided:

"The vertical shaft bearings to be oiled by means of a sight feed into the top of the four (4") inch pipe that supports the shaft bearings, the oil passing through each bearing to the one below it, and may finally pass into the well at the half-inch drain-pipe when the water in the well is pumped below it; all as shown in drawings herewith submitted and marked 1. E. 72, and 3. E. 22, and are made part of these specifications. The total length from bottom of suction to discharge will be (at top of well) two hundred (200) feet."

Layne, however, had a stagnant system, so designated by both the Fifth and Ninth Circuits, his shaft casing being provided with means to maintain an "*air-tight chamber*" to be "kept filled with clean liquid."

(P. 471) "In *Getty v. Layne* (C. C. A.) 262 Fed. 141, the court, on page 143, in discussing lubrication, referred to the closed casing as causing a *stagnation of oil in the bearings*."

* * * * *

(P. 472.) "* * * by this device the oil becomes stagnant in the bearings, and is blown out when sufficiently used or spent, * * *"

Western Well Works v. Layne & Bowler Co., 276 Fed. 471-472.

6. Alignment of Shaft and Bearings, Spiders and Bearings by Byron Jackson, Wedges and Bearings by Layne.

Byron Jackson used a crude form of spider, with 3 set screws or bolts backed against his discharge casing, as bearings for the shaft [R. 448]. On to these spiders he screwed his sections of shaft casing. Alternate bearings were used without set screws.

Layne kept his shaft casing in alignment by means of his wedges.

"I provide a system of wedges 33 which serve to keep the pump in place and hold it in proper vertical position." (Patent p. 2, ll. 4-7.)

"* * * The wedge system illustrated for tightening the pump casing in place may also, if desired, be used to center it with respect to the casing." (Patent p. 2, ll. 105-108.)

This is the only discussion in the patent of anything like alignment. The word itself is not used nor any equivalent. None of the claims, except possibly those mentioning bearings for the shaft, contain any suggestion of alignment. Bearings are not an element of either claims 9 or 20.

Summary.

It appears from this analysis that Byron Jackson's fundamental element is a *concentric discharge casing*. This has an inner shaft casing enclosing the shaft within. At first the shaft and shaft casing were held in alignment

by spiders braced against the inner walls of the discharge casing. The spiders were later changed in form to become sleeve couplings for the discharge pipe with spiders cast integral.

Layne, on the contrary, bases his structure on a *wedge system* designed to hold in proper vertical position and center with respect to the well casing, a shaft casing extending to the top of the well with a *side discharge pipe*.

Both mechanisms were designed to do away with the old framework on which were the bearings for the shaft. To support these bearings Layne devised a shaft casing extending to the top of the well, which carried the weight of his shaft in sections, the shaft itself being extensible at its joints to accommodate any irregularities in the alignment of the well bore.

Byron Jackson suspended his shaft from the top on a single thrust ball bearing and aligned it within his concentric discharge casing by means of the spiders braced against it. So also the inner shaft casing was held in proper vertical position and centered by the spiders.

The main features of the Byron Jackson construction are those used today in modern deep well construction, to-wit: the concentric discharge casing with the inner shaft casing, the shaft suspended as a unit from the top of the well on a single thrust bearing, the shaft and shaft casing aligned by spiders supported by the discharge casing.

Layne's main features have not been adopted, to-wit: the wedges for mounting the pump, fixing it in place, centering and holding it in proper vertical position; the extensible jointed pump shaft supported at intervals along its length, the side discharge pipe and the "air-tight chamber" shaft casing supporting the shaft's weight in sections.

Byron Jackson's mechanism is that which has revolutionized the art. The Fifth Circuit's finding that Layne did so, was made without knowledge of Byron Jackson's invention and on the basis of Layne's commercial success, *which was due to his adoption of Byron Jackson's teachings.*

X.

BYRON JACKSON'S ANTICIPATION OF LAYNE'S SHAFT CASING.

1. The 1901 Sludge Pump a Complete Anticipation.

We have already pointed out how Byron Jackson Machine Works sludge pump of 1901 shown in the drawing 1-C-66 [R. 1114] is a complete anticipation of Layne's shaft casing with its three alleged functions.

This 1901 sludge pump had a shaft casing with three functions:

(a) Protection by means of stuffing boxes at top and bottom.

(b) Lubrication by oil in a chamber closed by top and bottom stuffing boxes.

(c) Alignment with the aid of an intermediate bearing.

The features outlined in the sludge pump are equivalent to the corresponding features shown in the Layne patent.

The 5-inch tube in the drawing 1-C-66 corresponds to Layne's tube, his shaft casing 20, shown in Fig. 8; the shaft $1\frac{7}{16}$ of an inch in diameter corresponds to his shaft 39, 39' and so forth; the intermediate guide and thrust bearing marked 3 inches outside diameter corresponds to his guide and thrust bearing 47, and the thrust block immediately above this bearing corresponds to Layne's figure 48. The pump shaft and gland or stuffing box on the shaft marked $2\frac{1}{4}$ inches in diameter, corresponds to the stuffing box shown in Layne's figure 5 as No. 41. The construction of the two devices parallel each other very closely.

In the Layne patent there is a stuffing box consisting of a stuffing box cover or gland 41, and a packing space 40.

In Layne's figure 5, the stuffing box studs are shown as being operated by a rod from the surface, No. 44. In Byron Jackson's drawing the stuffing box bolts shown in the cross-section to the right are arranged to extend outside of the protecting tubes and to be operated from above.

The sludge pump had a shaft casing which protected, as Layne's did, with top and bottom stuffing box and with means for tightening the lower stuffing box, though no thrust collar sealed the lowest sleeve bearing.

The sludge pump's shaft casing lubricated, as Layne's did, the shaft and bearings by means of a "chamber" "kept filled" with clean liquid.

The shaft casing also aligned, as Layne's is alleged to do, by means of an intermediate bearing, the lack of which in Crannell prevented the Fifth Circuit in the Getty case from finding Crannell an anticipation.

"* * * * The limited depth of the pit, in which the Crannell patent was to be used, made it also unnecessary to use a jointed shaft and *intermediate bearings*. Layne solved his problem by the use of a jointed shaft with *intermediate bearings*, * * *"

Getty v. Layne, 262 Fed. 142.

The shaft casing of the sludge pump could have been adapted to a small bore well by Layne's wedges, if same were effective. It was adapted to a small bore well by Byron Jackson in his 1902 drawing and disclosure and his 1903 Pabst pump reduction to practice. In these later forms Byron Jackson put the shaft casing inside the discharge casing, took off the thrust collars from this shaft, using sleeve bearings from the top to the bottom, and put in a drain pipe [R. 452] at the bottom. The

sleeve bearings and drain pipe destroyed the chamber feature and made the lubrication system circulatory.

2. Byron Jackson's 1902 Invention as Reduced to Practice in 1903 Pabst Installation; a Complete Anticipation of All Possible Useful Features of Layne.

Byron Jackson's 1902 invention as disclosed in the drawing 1-C-75 [R. 1063] and the 1903 installed Pabst pump also *anticipates all the useful features* of Layne's shaft casing. It protects the shaft and bearings by stuffing boxes top and bottom. It provides for lubrication. It has intermediate bearings. It aids in alignment.

The only difference is that pointed out in the ninth circuit. It provides for oil draining out at the bottom through the sleeve bearings and drain pipe in order to cause a circulation of oil through the bearings.

Getty had no drain pipe but the sleeve bearing was sufficient opening to avoid infringement.

XI.

DECISIONS OF FIFTH AND NINTH CIRCUITS—POINTS IN HARMONY.

The Fifth and Ninth Circuits are in entire accord on the following points:

1. That the "Novelty and Patentability" of the Layne Patent "Admit of Doubt" and Can Only Be Sustained by a Restrictive Interpretation.

The case of *Van Ness vs. Layne* (5th Cir. C. C. A. 1894) 213 Fed. 804 found claim 13 not infringed, refused to sustain claim 9 in addition to claim 20, and doubtfully found claim 20 valid and infringed. The court said:

"though theoretically its novelty and patentability may admit of doubt." (213 Fed. 808.)

"and it seems that the question of infringement, like that of patentability, is a close one." (213 Fed. 809.)

The Van Ness decision only sustained claim 20 by reading into it limitations not expressed and finding that it covered a shaft casing with a triple function, attributing to the "protective casing" the additional functions of lubrication and alignment.

The court said:

"It seems quite clear that the idea of a protected casing without *restrictive* interpretation would contain no novelty and would not be patentable, and, if this element in the patent is given the unrestricted meaning that its language admits of, it would destroy the claim." (213 Fed. 807.)

The language referred to reads:

"* * * a line shaft for the pump entirely closed off from the water in the well."

It will be noted that the "protective casing" is not stated as an element.

The later Getty case also sustained Claim 20 as thus restricted, though in the Getty case the court, realizing that the claim did not use the terms "closed casing" or "protective casing" or their equivalent, ceases to use this form of expression, but expresses it as a "closed shaft."

The court said in the Getty case:

"It was only by giving the claim this *restricted* meaning, and *limiting* it to the description in the specifications, that the claim could be sustained." (262 Fed. 142.)

In the earlier Van Ness decision the court evaded to a large degree the mechanics of the patent. The court said:

"We must confess that we are not mechanics enough to determine with any assurance from the record the merits of these respective contentions, and it seems that the question of infringement, like that of patentability, is a close one." (213 Fed. 809.)

Judge Jack, district judge, Western District of Louisiana, in the later case (*Layne v. Getty*), involving the same patent, being embarrassed by the Van Ness decision, said:

"Were the question a new one, I should be inclined to hold the *patent invalid*.
* * *." [R. 1011.]

"As stated by the court in the Van Ness case, the question both as to patentability and infringement are close ones."

"Following the ruling in the Van Ness case, specifications numbers 9 and 20 must

be held invalid and infringed by defendant's pump." [R. 1016.]

Six years after the Van Ness appeal decision, the same judge wrote the Getty appeal opinion. He was then undoubtedly more learned in patent law, and he had the light of greater exposition before him with respect to the patent in suit and Layne's lubrication system.

With this clearer comprehension of the mechanics and law involved Judge Grubb in his later decision narrowed the patent to the specific mechanical means set out in the specifications of the patent, and greatly qualified and limited his former opinion, in effect overruling that portion of it dealing with lubrication.

In *Layne vs. Getty* (5th Cir. C. C. A.) 222 Fed. 917, on appeal from an order refusing a preliminary injunction, the court sustained Judge Jack's order because infringement was in doubt, though the patent had been adjudged valid, and on the second appeal case found non-infringement.

The Circuit Court of Appeals in the Ninth Circuit said:

" * * * In *Van Ness v. Layne*, 213 Fed. 804, 130 C. C. A. 462, the patent was held valid and claim 20 infringed. * * * But *the court was not very confident* that the protective casing as set out in the specification contained novelty enough to constitute invention. The fact, however, that there was for some time an unfilled want for some such apparatus as that disclosed by the patent, in the deep well irrigating

industry, persuaded the court that the idea involved invention, though theoretically its novelty and patentability *might admit of doubt.* * * *

Western Well Works v. Layne & Bowler Corporation, 276 Fed. 470.

Where the novelty of the invention is open to doubt, the patentee should be held to a rigid construction of his claims.

Wright v. Yuengling, 155 U. S. 47, 15 Sup. Ct., Rep. 1, 39 L. Ed. 64.

2. The Layne Patent Is "Limited and Narrow" With a Corresponding Narrow Range of Equivalents.

In *Getty vs. Layne* (5th Cir. C. C. A. 1920), 262 Fed. 143, the court said:

"Its advance over Crannell (1890 patent 13 years prior to Layne's filing date) prevented Crannell being considered by us an anticipation, and was enough to show novelty, *but it stops there.*"

The Ninth Circuit Court of Appeals said:

(P. 471) "In *Getty v. Layne* (C. C. A.), 262 Fed. 141, * * * the court held that the patent was not entitled to the wide range of equivalents of a pioneer patent."
* * * * *

(P. 470) "* * * when we turn to the analysis of the claims in suit, we find that the essential elements claimed to have been infringed are *limited and narrow*
* * *"

Western Well Works v. Layne & Bowler Co., 276 Fed. 470-471.

3. The Layne Patent Calls For An Entire Closure,

claim 20 reading, "a line shaft for the pump entirely closed off from the water in the well" and the specification describing the shaft casing as "an air-tight chamber."

In the Getty case the court said:

(P. 143) "Layne, according to the specifications of his patent, effected his closure at the top and bottom of his shaft by the presence of stuffing boxes, assisted by the effect of a downward thrust bearing and collar. In practice, Layne soon abandoned the use of packing boxes, substituting therefor a long sleeve bearing and retaining the collar. The downward thrust of the weight of the shaft and pump, together with the downward pressure of the column of oil in the shaft casing, accomplished his closure."

* * * * *

(P. 144) "The mere fact that Getty's closure is not complete, or not as *complete and effective* as that of Layne, is an unimportant fact. The material difference lies in the fact that Layne's patent effects the closure by *physical obstructions*, such as *packing boxes* and *thrust bearings*, aided incidentally only by the presence of the oil column, while Getty's *partial closure* is effected by balancing the pressure of the column of water outside the shaft casing against the pressure of the oil inside the casing, without the use of *physical obstruction*."

Getty v. Layne, 262 Fed. 143-144.

In the Ninth Circuit Court of Appeals the court said:

(P. 471) "With respect to the shaft casing protecting the shaft from the ingress of water, claim 20 provides that the line shaft shall be *entirely* closed off from the water.

* * * * *

This specification (referring to the ejecting of spent liquid and refilling) clearly calls for an *air-tight casing* as provided in the other specification previously referred to.

(P. 472) "In the Layne patent the shaft casing is *entirely closed*, or that is the invention claimed in claim 20 and is necessarily the operative device of that claim and of claims 9 and 13, * * *

We are of the opinion that there is invention in the *entirely closed* casing of the Layne patent as claimed in claims 9, 13 and 20, particularly claim 20, functioning as it does in *complete* protection to the line shaft from the ingress of water and sand and in protecting the means for lubrication."

(P. 476) "The Layne application for a patent was filed in the Patent Office, April 28, 1903. The dominant element in that invention was the claim for a line shaft for the pump *entirely closed off* from the water in the well."

Western Well Works v. Layne & Bowler Co., 276 Fed. 471, 472, 476.

4. The Layne System of Lubrication Is "Stagnant"

providing for forcing out spent liquid at the top, and is not infringed by "a circulatory system" such as Getty, Byron Jackson and the Western Well Works structures have providing for passage out of oil at the bottom.

"In *Getty v. Layne* (C. C. A.), 262 Fed. 141, the court, on page 143, in discussing lubrication, referred to the closed casing as causing a *stagnation of oil* in the bearings. The court said:

"Layne's method of lubrication was to put the oil in at the top and to permit it to descend to each of the bearings, and *remain stagnant* within the shaft casing until ejected from the top after it had become spent by air pressure through an air vent. When it was ejected, it was replaced by clean oil from the top again. On the other hand, *the oil was confined* at the bottom of the well by use of a packing or stuffing box. *Getty adopted a circulatory system* of lubrication. By it the oil was also introduced from the top, and descended to the lower bearings by gravity. However, at the bottom there was *only a partial obstruction* to its exit, presented by a long sleeve bearing. Its passage out from the shaft casing was automatic and continuous, so that there was a constant and free flow of lubricant from the top of the line shaft, throughout its length, and out through its bottom. This method was claimed to be necessary to Getty's device, because wear on the upper bearing required a continuous supply of fresh oil for its proper lubrication. These functional differences between the *stagnant* and *circulatory* system of lubrication prevent their being considered as merely mechanical equivalents."

"* * * by this device the oil becomes *stagnant* in the bearings, and is blown out when sufficiently used or spent, * * *"

Western Well Works v. Layne & Bowler Co., 276 Fed. 471, 472.

5. That Specific Means for the Escape of Oil at the Bottom of the Shaft Casing Avoids Infringement.

The Getty appeal decision reads (p. 143):

"* * * However at the bottom there was only a partial obstruction to its exit, presented by a long sleeve bearing. Its passage out from the shaft casing was automatic and continuous, so that there was a constant and free flow of lubricant from the top of the line shaft, throughout its length, *and out through its bottom*. This method was claimed to be necessary to Getty's device, because wear on the upper bearing required a continuous supply of fresh oil for its proper lubrication. * * *

(P. 144):

* * * * *

We think Getty has accomplished closure and lubrication by means so functionally different from Layne's disclosure in his patent, that they cannot be said to be mere mechanical equivalents, but rather distinct methods of attaining the same object; the object itself not being patentable. * * *

Getty v. Layne, 262 Fed. 143, 144.

The Western Well Works appeal decision reads (p. 472):

"* * * the defendants' shaft is not entirely closed but permits the oil to circulate down through the bearings and *out at the bottom* while the pump is in operation."

(P. 474):

"* * * but the controlling question still remains to be determined. Does the lubricating oil introduced into the defend-

ants' shaft casing pass down through the bearings, and after being used and spent, finally *pass out at the bottom* of the shaft into the well proper through a channel or auxiliary conduit constructed for that purpose? If it does, then it is not the same mechanical device for lubrication claimed and specified in the plaintiff's patent. The *plaintiff's device does not have any outlet for the used and spent oil to pass out* into the well, and as we understand the mechanical construction of plaintiff's pump, it was devised, in part at least, for the specific purpose of avoiding that objection."

(P. 477):

"* * * The defendants' pump is substantially the Jackson mechanism with respect to the *discharge* of used or spent oil *from the bottom shaft* into the water of the well, and is therefore not an infringement of plaintiff's patent for an entirely closed casing for the line shaft."

Western Well Works v. Layne & Bowler Co., 276 Fed. 472, 474, 477.

XII.

DIFFERENCES BETWEEN FIFTH AND NINTH CIRCUITS.

1. Novelty in Shaft Casing With Three Functions Including Alignment — Fifth Circuit.

In *Van Ness v. Layne* (C. C. A. 5th Cir.), 213 Fed. 804, the court said (p. 807):

"It seems quite clear that the idea of a protected casing for a pump shaft without

restrictive interpretation would contain *no novelty* and would not be patentable, and, if this element in the patent is given the unrestricted meaning that its language admits of, it would destroy the claim."

(P. 808):

"If so limited, it would seem that the protective casing intended to be covered by the claim was one of the kind described in the specifications and *having the three functions* attributed to it by the specifications, namely: (1) To exclude water and detritus from the shaft and its bearings; (2) to provide a means of lubricating the bearings of each section of the shaft from the top of the well without removing the apparatus from it; and (3) *to align* the bearings and the shaft so as to prevent lateral displacement in the well and keep the shaft in a vertical position."

(P. 809):

"The third function performed by the shaft casing of the patent in suit is that of *aligning* the bearings of the pump shaft so as to keep the latter in vertical position in the well."

(P. 810):

"* * * we have come to the conclusion * * * that claim 20 of the complainant's patent should be sustained, and that the defendant's apparatus should be held to infringe it in the one respect of a closed casing for the pump shaft *of the design and with the triple function* attributed to it in the specifications of Layne's patent."

In *Getty v. Layne* (C. C. A. 5th Cir.), 262 Fed. 141, the court said (p. 142):

"The twentieth claim of the patent—that sustained in the case of *Van Ness v. Layne*, *supra*—covered 'the combination of a well casing, a rotary pump therein, and a line shaft for the pump *entirely closed off from the water in the well*.' Validity was given this claim by defining a closed shaft to be *one having the three functions of (1) aiding the alignment of the shaft in the well casing; (2) providing for lubrication of the shaft and bearings; and (3) protecting the shaft and bearings from water and sand.*"

* * * * *

"It was only by giving the claim this restricted meaning, and limiting it to the description in the specifications, that the claim could be sustained."

(P. 144):

"Referring the closed shaft of Layne to the description in the specifications of his patent, as we must do, we think the differences from Getty's mechanism with respect to means of *alignment*, lubrication, and closure are so important that Getty's differing means should not be held to be mechanical equivalents, and should not be held to infringe the closed shaft of Layne's patent."

To find novelty the court was compelled to restrict the claim to a shaft casing with *three* functions because the prior art introduced in those cases showed Crannell 1890 patent [R. 1022], Byron Jackson 1890 patent (Getty Record), the 1894 Eisler patent [R. 1018], the 1900 Prindle Orpheum Theatre pump (Getty Record); and others which had two functions (1) lubrication and (2) protection but without

intermediate bearings hence without alignment. Without alignment the casing lacks novelty, in view of the prior art shown in the Fifth Circuit cases. The new Byron Jackson defenses in the Ninth Circuit destroy the alleged novelty.

2. Novelty of "Entirely Closed Casing" Without Alignment Which Is Not a Function of Shaft Casing—Ninth Circuit.

In *Western Well Works v. Layne & Bowler Co.*, 276 Fed. 465, the court said (p. 471):

"Our conclusion is that the shaft casing has only two functions: (1) To protect the shaft and its bearings from the water and sand pumped to the surface, and (2), to inclose the means provided for lubrication of the shaft bearings. The function of alignment is therefore dismissed from further consideration."

(P. 472):

"We are of the opinion that there is invention in the *entirely* closed casing of the Layne patent as claimed in claims 9, 13 and 20, particularly claim 20, functioning as it does in *complete* protection to the line shaft from the ingress of water and sand and in protecting the means for lubrication."

This decision overlooks the Crannell 1890 patent [R. 1022] with its casing closed by stuffing boxes, the Byron Jackson 1890 patent, the 1894 Eisler patent [R. 1018] with its closure means and other tightly closed casings shown in evidence in this and the prior cases.

XIII.

CONCLUSION.

1. The Novelty Adjudged Layne by the Fifth Circuit Destroyed in Substance by the New Byron Jackson Defenses in the Ninth Circuit.

The novelty of the Layne shaft casing according to the Fifth Circuit is in the adaptation of the shaft casing to a deep well pump by the insertion of intermediate bearings creating the function of alignment.

Judge Jack, who decided the Getty case in the lower court trial, in his opinion said:

"The CRANNELL apparatus, which was not a commercial success, provided for a closed casing around the shaft transmitting power to a rotary pump, *but did not provide intermediate bearings* along the line of the shaft. This absence of *intermediate bearings* is practically the only difference in principle between the two mechanisms insofar as claims 9 and 20 are concerned." [R. 1010.]

On appeal the Circuit Court of Appeals said:

"* * * The limited depth of the pit, in which the Crannell patent was to be used, made it also unnecessary to use a jointed shaft and *intermediate bearings*. Layne solved his problem by the use of a jointed shaft with *intermediate bearings*. * * *"

Getty v. Layne, 262 Fed. 142.

The Byron Jackson 1901 sludge pump [R. 1114] and the 1902 drawing 1-C-75 [R. 1063]

and the 1903 pump were not in the Getty case. These all provide for intermediate bearings, though not shown in 1902 drawing. (See drawing, Mead ex. 74, R. 1065, small figure for spider bearing. If the Byron Jackson defenses had been in the Getty case the Layne patent would have been found invalid, because the alleged alignment function of the shaft casing was anticipated by Byron Jackson.

We pointed out to the Circuit Court of Appeals in the Ninth Circuit that the function of alignment was not mentioned in the patent nor claimed in the claims and particularly that neither claims 9 nor 20 contained the element "intermediate bearings" necessary for alignment.

That court sustained our contentions and eliminated alignment from consideration.

2. The Novelty Found by the Ninth Circuit in Layne's "Entirely Closed Casing" Is Without Utility.

The Circuit Court of Appeals in the Ninth Circuit, however, still found novelty in the shaft casing of claims 9, 13 and 20 in providing for an "*entirely closed*" casing, the "air-tight chamber" of the specifications.

We concede novelty in the contrivance for making an air-tight chamber with the special tightening means for the lower stuffing box and the mechanism for forcing out spent oil at the top. They are and were unique but *lack utility*.

Such a structure was never built; it has never been used.

Mr. Layne himself admitted [R. 595] that he never used the stuffing box 41, Figure 5 of the Patent, and that he had never used the adjusting mechanism shown by the sprocket chain 46, and the sprocket 42, 42', 42'' shown in Figure 6 of the Patent, nor the pipe 44 shown in Figure 5 down to the bottom of the shaft tubing. He further admitted [R. 598] that he had never used the thrust collars 48 and 48' for thrust purposes. [R. 599.] "So far as contacting the bearings, we have never used that (thrust collar 48) as a commercial product, containing the bearings for thrust purposes."

Where a device has never gone into actual use much caution is exercised by the courts in attributing to the patent anything more than is plainly shown and distinctly claimed.

Non-use raises an inference against utility.

Henry v. City of Los Angeles (9th Cir.),
255 Fed. 769, 780, quoting:

*National Malleable Castings Co. v. Buck-
eye M. I. & C. Co.* (6th Cir.), 171
Fed. 847.

Layne's air-tight chamber shaft casing not only never has been used, but could not be used.

No lubricant could work through the thrust bearings shown in Layne's patent. They are each too heavily weighted with the section of shaft below. In Byron Jackson's sludge pump his intermediate thrust bearing collar was attached to a shaft passing as a unit through the bearings. Oil would work through on account of the irregularities in the motion of the shaft. It differed from Layne's jointed shaft and bearings in this respect. Moreover in the sludge pump there was only the one of such bearings to work through. For a long shaft such bearings would be impracticable.

Byron Jackson was afraid that the oil would not get through his intermediate bearings in the Pabst pump, though they were only sleeve bearings without the shaft thrust-collar seal.

So, to be sure that the oil would get through the intermediate bearings, he bored an oil hole [R. 473] and put in a little $\frac{1}{4}$ " pipe extending up above the bearing about $\frac{3}{8}$ or $\frac{1}{2}$ of an inch so as to flood the bearings and allow the excess to pass down through. [R. 399.]

Byron Jackson's fear, as to oil failing to pass through his sleeve bearings, is a certainty as to Layne's thrust bearings.

Layne's air tight chamber closed with stuffing boxes top and bottom, and thrust bearings is not practicable and is without utility.

Hopkins on Patents, page 356, says:

"UTILITY IS INDISPENSABLE TO A VALID PATENT. This is established by the language of the patent act, Section 4886, R. S. U. S., expressly limiting its benefits to arts, machines, etc., which are both new and useful. Novelty and utility, both must concurrently exist, or the grant of a patent is a nullity."

See also:

Mitchell v. Tilghman, 86 U. S. 267,
page 396, 22 L. Ed. 125, 137,

where the court says:

"Inventions, in order that they may be proper subjects of letters Patent, must be new and useful. Utility, in most cases, is a question of fact, as it usually depends upon the evidence resulting from actual experiment."

The fact that it never has been used though nearly seventeen years have now elapsed since its disclosure indicates its worthlessness.

Robinson on Patents, Vol. 1, Section 338:

"In order that an invention may be patentable, it must not only be bestowed upon the public by its inventor, but when bestowed it must confer upon them a benefit. The invention must, therefore, be useful, as well as new."

3. The Claims Should Be Adjudged Invalid for Lack of Novelty, Invention and Utility; Claim 20 Also for Indefiniteness, Aggregation and Functionalism.

Claims 9, 13 and 20 should be held void because the entirely closed casing of those claims is mechanically impossible, is without utility.

Moreover, unless the shaft casing of claim 9, read into claim 20, has the function of alignment as well as lubrication and protection, it differs in no respect from the prior art shown in the Fifth Circuit cases,—is without novelty.

The insertion of intermediate bearings in a closed shaft casing to give it the function of alignment was not invention in view of the prior art, and was anticipated by Byron Jackson.

Claim 9 also contains in combination the useless “jointed” shaft.

Claim 13 also contains in combination the useless adjunct, the “air vent” for forcing in air to eject spent fluid.

Claim 20, which is the only one that has survived of the 22 claims granted, is indefinite, and,

as hitherto construed to include the shaft casing, is functional and a mere aggregation. In any event it is anticipated by Byron Jackson who had the Pabst pump installed and running before this claim 20 was proposed to the patent office.

The claims should be adjudged invalid.

Respectfully submitted,

DAVID P. WOLHAUPTER,

Amicus Curiae.

RAYMOND IVES BLAKESLEE,

CHARLES C. MONTGOMERY,

Of Counsel.

In the Supreme Court of the United States

OCTOBER TERM, 1922.

No. 278.

LAYNE & BOWLER CORPORATION,
Petitioner and Plaintiff,

vs.

WESTERN WELL WORKS, ET AL.,
Respondents and Defendants.

MOTION FOR LEAVE TO APPEAR AS AMICUS CURIAE AND BRIEF THEREON.

TO THE SUPREME COURT OF THE UNITED STATES:

And now comes David P. Wolhaupter and respectfully moves before this Honorable Court that an order be entered granting leave to file an appearance and brief and to present an oral argument in the above-entitled case as *amicus curiae* on behalf of the American Well and Prospecting Company, et al., defendants in the case of Layne & Bowler Corporation vs. American Well and Prospecting Company, et al., now pending in the United States District Court for the Southern District of California, Southern Division, and involving the same patent as is involved in the above-entitled case, to wit, patent No. 821,653.

This motion is based on the following grounds:

I.

That Layne & Bowler Corporation, plaintiff and petitioner in the above-entitled case, brought an action against the American Well and Prospecting Company, et al., in the Southern District of California, Southern Division, on the 18th day of November, 1919, alleging infringement by the defendants of said patent No. 821,653. The said case was referred to the late Honorable Lynn Helm, as Special Master in Chancery to hear and determine. The trial commenced January 2, 1920, and continued from time to time until July 13, 1920, when the Master made and filed his report after some forty days of actual trial, finding the patent valid and infringed as to one form of structure previously manufactured by the defendants, and non-infringed as to a second form of structure adopted by defendants at a later date. As to said second form contempt proceedings were brought for violation of a temporary restraining order theretofore made by the Court. Said contempt proceedings were adjudicated in favor of the defendants who were entirely purged of contempt. Said case is still pending on exceptions to the Master's report by all parties.

II.

That subsequent to the filing of the Master's report in the case of Layne & Bowler Corporation vs. American Well and Prospecting Company, et al., above set out, the plaintiff brought on for trial in the Northern District of California the case now pending on *certiorari* before this Honorable Court, to wit, the case of Layne & Bowler Corporation vs. Western Well Works,

et al., and the same after a four-day trial was decided in favor of plaintiff, finding the defendants' structure to be an infringement. Defendants in the case pending in the Southern District of California took no part in the trial or preparation of the case tried in the Northern District, nor were they heard as *amici curiae*.

III.

That the defendants in the case last above mentioned in the Northern District of California prosecuted an appeal to the Circuit Court of Appeals, Ninth Circuit. That plaintiff urged and obtained a delay of hearing the exceptions to the Master's report in the Southern District pending the final determination of the Western Well Works case in the Circuit Court of Appeals.

IV.

That defendants in the Southern District case thereupon had their counsel obtain leave to file briefs and argue orally as *amici curiae* in the Northern District case in the Circuit Court of Appeals, Ninth Circuit.

That defendants' counsel in the Southern District prepared and filed briefs and made an oral argument in the Northern District case in the Circuit Court of Appeals, Ninth Circuit, and thereafter said Court rendered its decision reversing the trial court following in the main the contentions and points of the *amici curiae*.

V.

That defendants in the Southern District then vigorously urged the hearing of the exceptions to the Mas-

ter's report in said Southern District case, but plaintiff's counsel opposed said hearing on the ground that he had filed a petition for *certiorari* in the Supreme Court of the United States and the matter was delayed over defendant's strenuous objections, until the Supreme Court's determination of the petition for *certiorari*.

VI.

That upon the granting of the petition for *certiorari* defendants' counsel again urged the hearing of the exceptions, setting out among other things that the determination of the case in the Supreme Court would not change the result or the ruling as to the exceptions to the Master's report, inasmuch as the Master's report was based upon points decided in the case of *Getty vs. Layne*, decided in the 5th Circuit, 262 Fed. R. 141, which points were subsequently followed in the 9th Circuit Court of Appeals in *Western Well Works Inc., et al., vs. Layne & Bowler Corporation*, 276 Fed. R. 465, the present case on *certiorari*.

That the District Court in the Southern District, without going into the merits of this contention, manifested extreme reluctance to hear the exceptions to the Master's report until the determination of this case in the Supreme Court.

VII.

That the defendants in the Southern District case urge the necessity of their counsel as *amici curiae* assisting the Supreme Court to a speedy and proper adjudication of the patent because of the expressed

intention of the District Court of the Southern District to follow the decision of the Supreme Court as to the interpretation and scope of the patent involved in both suits, and because there are several structural differences between the defendants' structure in the Northern District and the defendants' structure in the Southern District, which make it important to obtain a proper determination of the scope and effect of the patent (if indeed the claims of the patent in suit be found valid at all).

Suggestion As to Argument.

Movent also suggests that this Honorable Court entertain his motion to be made at or prior to the oral argument of this case, for the admission of his California associates, to wit, said counsel for defendants in the Southern District case and who appeared and filed briefs as *amici curiae* on said appeal in the Circuit Court of Appeals and made oral argument therein, namely, Raymond Ives Blakeslee, Esq., and Charles C. Montgomery, Esq., and Movent will move the Court for leave for said counsel to participate in the oral argument in this Court, in order that this Court may have an opportunity to hear and interrogate said counsel, as may be desirable.

DAVID P. WOLHAUPTER,
Amicus Curiae.

Dated August 28, 1922.

IN THE SUPREME COURT OF THE UNITED
STATES.

OCTOBER TERM, 1922.

No. 278.

LAYNE & BOWLER CORPORATION,
Petitioner and Plaintiff,

vs.

WESTERN WELL WORKS, ET AL.,
Respondents and Defendants.

**NOTICE OF MOTION FOR LEAVE TO APPEAR AS
AMICUS CURIAE.**

To Frederick S. Lyon, William K. White, and Leonard S. Lyon, Solicitors and Counsel for plaintiff and petitioner on *certiorari*, and Charles E. Townsend, William A. Loftus and Frederick D. McKenney, Solicitors and Counsel for defendants and respondents on *certiorari*:

You and each of you will please take notice that at the opening session of the Supreme Court of the United States, October Term, 1922, on the 9th day of October, 1922, or as soon thereafter as counsel can be heard, and in the Court room ordinarily occupied by said Court in Washington, D. C., I will present motion for leave to appear as *amicus curiae*, copy of which is

hereto attached, and pray the Court to make and enter to that end an order, copy of which is hereto annexed.

DAVID P. WOLHAUPTER.

Dated August 29, 1922.

Received copy of the foregoing notice and annexed motion and copy of proposed order, this 29th day of August, 1922, as to solicitors and counsel for petition on *certiorari*.

FREDERICK S. LYON,
WILLIAM K. WHITE,
LEONARD S. LYON,

*Solicitors and Counsel for Plaintiff
and Petitioner on Certiorari,*

and this 30th day of August, 1922, as to Solicitors and Counsel for defendants and respondents on *certiorari*.

CHAS. E. TOWNSEND,
WM. A. LOFTUS,
FREDK. D. MCKENNEY,

*Solicitors and Counsel for Defendants
and Respondents on Certiorari.*

FILED

JAN 29 1923

WM. R. STANSBURY
CLERK

Number 278

In the Supreme Court

OF THE
UNITED STATES

OCTOBER TERM, 1922

LAYNE & BOWLER CORPORATION,

Petitioner,

vs.

**WESTERN WELL WORKS, INC. (a Corporation), RO-
TARY DRILLING AND DEVELOPMENT COMPANY
(a Corporation), STANLEY M. HALSTEAD, P. E.
VAUGHAN and ALLEN W. ROSS,**

Respondents.

ON WRIT OF CERTIORARI TO THE UNITED STATES
CIRCUIT COURT OF APPEALS FOR THE
NINTH CIRCUIT

PETITIONER'S OPENING BRIEF

FREDERICK S. LYON,
LEONARD S. LYON,
312 Stock Exchange Building,
Los Angeles, California,
Solicitors and Counsel for Plaintiff-Petitioner.

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In the Supreme Court

OF THE
UNITED STATES

October Term, 1922

LAYNE & BOWLER CORPORATION,

Petitioner,

vs.

WESTERN WELL WORKS, INC. (a Corporation),
ROTARY DRILLING AND DEVELOPMENT COMPANY (a Corporation),
STANLEY M. HALSTEAD, P. E.
VAUGHAN and ALLEN W. ROSS,

Respondents.

No. 278.

*On Writ of Certiorari to the United States Circuit
Court of Appeals for the Ninth Circuit*

PETITIONER'S OPENING BRIEF

This case comes before this Court on writ of certiorari addressed to the United States Circuit Court

of Appeals for the Ninth Circuit, for the purpose of enabling this Court to review that Court's decree *reversing* an interlocutory decree of the United States District Court for the Northern District of California finding petitioner's (plaintiff's) Patent No. 821,653, dated May 29, 1906, valid and infringed as to claims 9, 13 and 20.

For convenience, in this brief we shall refer to the parties by their titles in the trial Court—your petitioner was plaintiff, and respondents defendants.

The United States Circuit Court of Appeals for the Ninth Circuit, which heard this case, was constituted by the Honorable William B. Gilbert, Presiding Circuit Judge, the Honorable William W. Morrow, Circuit Judge (now retired), and the Honorable Charles E. Wolverton, District Judge.

The case was tried in the District Court by the Honorable Frank S. Dietrich, District Judge. Judge Dietrich presided at the trial in open court. He heard the testimony of the witnesses, had the advantage of inspecting the various exhibits in connection with the giving of the testimony of the witnesses, took the case under submission, had before him extensive printed briefs, and, after extended consideration, rendered a careful opinion (Record, p. 887) sustaining the patent and finding infringement of Claims 9, 13 and 20 (the claims declared upon).

DECISION OF U. S. CIRCUIT COURT OF APPEALS BY A
DIVIDED COURT

The majority of the Circuit Court (Circuit Judge Morrow and District Judge Wolverton) disagreeing with the minority thereof (Presiding Judge Gilbert), reversed Judge Dietrich's findings both as to *infringement* and as to *how the defendants' apparatus was constructed*. His Honor, Judge Gilbert, sustained Judge Dietrich's findings, and expressed, in a dissenting opinion (276 Fed., 477), his dissent from the majority opinion and decision.

We thus see that, by a divided court, the majority consisting of the Junior Circuit Judge and a District Judge, the findings of District Judge Dietrich (confirmed by the opinion of the Senior Presiding Circuit Judge) were reversed.

LAYNE PATENT IN SUIT, CLAIMS 9, 13 AND 20, VALID

However, not only did Judge Dietrich find the patent in suit and Claims 9, 13 and 20 thereof, *valid*, but said Circuit Court of Appeals unanimously held and determined said patent and each of said claims, valid. This is clear from a reading of both the majority and minority opinions. This is distinctly admitted in respondents' brief filed in opposition to the petition for certiorari. See heading of said respondents' brief, page 3: "Decisions of 5th and 9th Circuits are in complete harmony as to validity of Layne patent"; under which heading, respondents say: "*As a matter of fact, all of the decisions affecting the*

Layne patent have been uniform in holding said patent valid." The majority of said Circuit Court of Appeals for the Ninth Circuit based their decision in this case, not upon any invalidity of the Layne patent or claims, but upon a narrow and strict construction of the patent, by limiting it to the exact construction shown in the drawings and described in detail in the specification, notwithstanding the adjudicated fact that the Layne invention "did accomplish a revolution in the well drilling industry," and filled a long-felt need in the deep well irrigating business, and was an invention of such merit as to be entitled to protection against a reasonable range of mechanical equivalents.

The Honorable Circuit Court of Appeals for the Ninth Circuit, by the majority opinion, reversed the findings of fact of Judge Dietrich:

1. As to how defendants' mechanism was constructed and operated, and
2. As to its infringement of Claims 9, 13 and 20 of the Layne patent in suit.

Judge Dietrich heard the testimony of the witnesses, and his decision of the facts as to how the defendants' pumping apparatus was constructed and how it operated, was conclusive. His findings were an adjudication of conflicting testimony. The majority of the said Circuit Court of Appeals declined to follow the rule of this Court, reiterated in *Adamson vs. Gilliland*, 242 U. S., 350, 353, that:

"Considering that a patent has been granted to the plaintiff, the case is pre-eminently one for the

application of the practical rule that, so far as the finding of the master or judge who saw the witnesses depends upon conflicting testimony, or upon the credibility of witnesses, or so far as there is any testimony consistent with the finding, it must be treated as unassailable. *Davis vs. Schwartz*, 155 U. S., 631, 636 (15 Sup. Ct. 237, 39 L. Ed. 289). The reasons for requiring the defendant to prove his case beyond a reasonable doubt are stated in the case of *The Barbed Wire Patent*, 143 U. S., 275, 284 (12 Sup. Ct., 443, 450, 36 L. Ed., 154)."

Not only are Judge Dietrich's said findings of fact *as to the construction and mode of operation* of defendants' pumping apparatus conclusive and unassailable, because not only fully supported by competent evidence, but because they are the determination of the trial Court of conflicting testimony—but such findings of fact have the direct affirmation of the Presiding Circuit Judge, in his dissenting opinion in this case. Necessarily, if the majority of the Circuit Court of Appeals is in error in reversing said findings of fact, it follows, the said majority opinion is not a decision of the issues of this case based upon the facts of the case. If said majority are wrong as to the mechanical construction and mode of operation of the defendants' pumping apparatus, presumptively such majority is in error as to its conclusion as to infringement.

The Layne patent in suit has many times been in litigation. It has three times been before the Circuit Court of Appeals for the Fifth Circuit. In each of these cases, its validity has been determined.

See

El Campo Machine Co. vs. Layne, 195 Fed., 83;

Van Ness vs. Layne, 213 Fed., 804;

Getty vs. Layne, 262 Fed., 141.

Said Circuit Court of Appeals for the Fifth Circuit has found, as did Judge Dietrich in the trial of this case, and as did Presiding Circuit Judge Gilbert in the Court of Appeals in this case, that the Layne invention was not a mere improvement in details of construction, but, on the contrary, the Layne invention was of a fundamental, generic character, did accomplish a revolution in the well-drilling industry, and was an invention of such merit as to be entitled to protection against a reasonable range of mechanical equivalents.

The majority of said Circuit Court of Appeals for the Ninth Circuit have fallen into the error of looking at the mechanical details and construction of the parts and elements of Mr. Layne's embodiment of his invention, and overlooking Mr. Layne's real invention. As said by this Court in *Smith vs. Nichols*, 21 Wall., 112:

"A patentable invention is a mental result. . . .
The machine, process or product is but its material reflex and embodiment."

For the purposes of this suit, and *with a complete knowledge of Layne's generic invention*, the defendants searched the prior art and therefrom selected the numerous prior art patents introduced in evidence herein. These prior art patents disclose the progress

in this art from the year 1860 up to the date of Layne's application, filed on April 28, 1903. The earliest prior patent, that of Thompson, is dated November 13, 1860; the latest patents are those of Alvord, issued August, 1903. None of the courts before whom the Layne patent has been in litigation, have found in any one or all of these prior patents Mr. Layne's fundamental, generic invention. On the contrary, the novelty thereof has been repeatedly recognized by the courts. The Court of Appeals for the Fifth Circuit, in the *Van Ness* Case (213 Fed., 804, at p. 808), found that there was a long "*unfilled want*" for just such a well mechanism as that embodying Mr. Layne's generic invention. Defendants have proved that *forty-three (43) years of development* in this art, prior to Mr. Layne's invention, *had not filled such want*.

Prior to conceiving his invention early in 1902 (R. 860), Mr. Layne had been for many years engaged in the well business, commencing that line of work in South Dakota in 1883, and thereafter continuing the same in the States of Iowa, Minnesota and Nebraska, until he went to Texas in 1902 (R., 549).

Prior to the introduction of Mr. Layne's revolutionary invention, the general type of pump installation was one involving the digging of an open pit and the mounting of the pump on the bottom of the pit. The pit was necessarily of sufficient size to permit the well-diggers to go down into the pit and assemble the mechanism therein. In order to lubricate the bearings of the pump placed therein, it was

ordinarily necessary for man to go down into the pit for this purpose. Any repairs required must be made by man entering the pit. Sometimes individual pipes led from the surface of the ground to the respective bearings, so that lubricant might be delivered to the respective bearings. Such a pit construction is illustrated in "Plaintiff's Exhibit No. 2" (R., 915), reproduced on the opposite page.

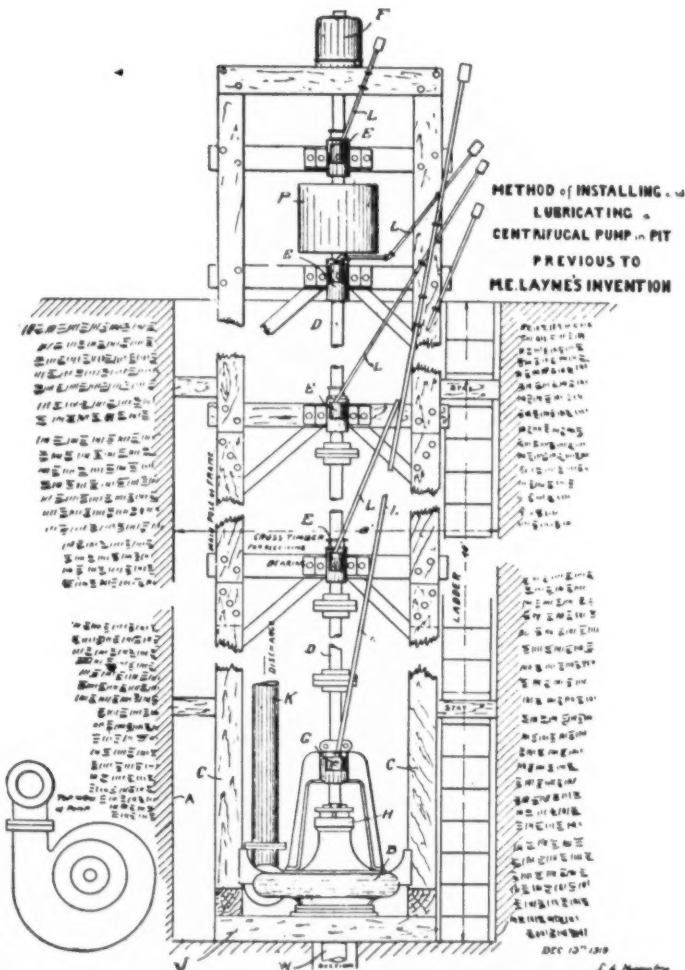
THE LAYNE INVENTION

Mr. Layne had for years been installing pumps. He was thoroughly familiar with the dug pit installation—its dangers and inefficiencies. The problem, which confronted him and which he so successfully solved by his fundamental invention, was:

How could a mechanism be organized that would be efficient, practical and durable, and at the same time eliminate the necessity of man going down into the dug pit, and eliminate the necessity of the installation of the pump on the bottom of the pit or on the framework in the pit? How could he obviate—

- (1) the necessity of digging the pit, and thereby eliminate
- (2) the risk necessarily assumed by man due to
 - (a) Danger of caving while the pit was being dug or while the men worked in the pit boarding it up or installing the pump; and
 - (b) The risk of personal injury or loss of life (frequent with the dug pit construction) due

Plaintiff's Exhibit No. 2.



to the necessity of man descending into the pit to lubricate, make necessary repairs, etc.?

- (3) How could he construct and assemble on the ground a pump structure of the necessary great length (Layne pump structures, 400 to 800 feet long, have been installed) and still be able to insert it in the small bore of a well?
- (4) How could he vary the length of such pump structure, after installation, in order to raise or lower it according to any variation in the level of the water in the well?
- (5) How could he protect the many necessary bearings for the long pump operating shaft so that the sand and other destructive detritus carried by the water being pumped would not cut out or destroy such bearings?
- (6) How could he assemble the bearings and pump shaft in proper relation and maintain the bearings in such relation without the necessity of man descending into the well hole?
- (7) How could he provide for the alinement of such a long pump shaft in the well?
- (8) How could he efficiently lubricate the many bearings required in such a structure?

The want of a pumping mechanism which would solve this problem had existed for years. The record proves that the problem was a real one. Mr. Layne saw the problem. As found by the Circuit Court of

Appeals of the Fifth Circuit in *Getty vs. Layne*, 262 Fed., 141, at p. 143, "The Layne patent . . . did accomplish a revolution in the well-drilling industry." Mr. Layne first conceived the idea of supporting the whole mechanism at the top of the well so that it would hang pendent, like a plumb-bob. He conceived assembling the pumping mechanism at the top of the well and lowering it into the well from the top. He conceived the idea that, as the pump was lowered into the well, unit after unit of the well mechanism could be assembled or added from the top of the well. That when the pump reached the desired depth, the assembled mechanism could be suspended from the top of the well, the entire structure could hang pendent like a plumb-bob. When repairs were required, the pendent mechanism could be pulled out of the well hole, bringing any portion thereof available at the surface of the ground. Thus, no entry of the well hole by man would be required.

Mr. Layne conceived the basic idea that such a well mechanism, to be practical, and, notwithstanding its great length, be capable of insertion into the small bore of a well, must be built up of many units, so that, *unit by unit*, the structure could be assembled at the mouth of the well bore, and, after the addition of each succeeding unit, be lowered a unit length into the well. This idea of assembling the pump and its mechanism at the top of the well, and inserting the assembled pumping mechanism into the well and supporting it pendent from the top of the well, was revolutionary. It *pointed* to a solution of the dug pit

problem. But Mr. Layne knew that such conception did not wholly solve the problem. It was only a partial solution. *It merely pointed out the right road to be traveled in order to reach the desired goal.* Many additional problems obstructed such road; *problems which had baffled all prior inventors in this art and had caused many to seek entirely different roads, leading only to failure,* as evidenced by the forty-three years' development of the art as shown by the prior patents in evidence, no one of which accomplished Mr. Layne's purpose or filled this long-felt want.

Some of these additional problems confronting Mr. Layne were:

(a) How could he provide the necessary bearings to keep the pump shaft in alinement?

(b) How could he insert and hold such bearings in such position along the shaft and hold them in alinement?

(c) How could he lubricate such bearings?

(d) How could he protect such bearings from the destructive action of the sand, etc., in the water being pumped?

All these things had to be provided for in such a manner that all parts of the well mechanism could be assembled, unit by unit, at the top of the well, and, when lowered into the well, would function properly without the necessity of man entering the well for any purpose whatsoever.

Without a solution of these problems, Layne's underlying idea of assemblage and installation from the top of the well, and of the pendent support, could not be realized. Confronted with these problems, Mr. Layne conceived enclosing the line or power-transmitting shaft in a conduit or shaft-enclosing casing. Mr. Layne further conceived that this shaft-enclosing conduit or casing could readily be made up in sections. That it was feasible to so enclose the line or power-transmitting shaft from the top of the pump to the top of the well. That such a shaft-enclosing conduit or casing could be made up of sections of any desired length. Here was the solution of the problem of bearings. Here was the solution of the problem of alining the bearings and keeping them in alinement. Here was the solution of the problem of protecting the bearings from the destructive action of the sand and detritus carried in the water being pumped. Here was the solution of the problem of lubricating these bearings. Mr. Layne conceived that this line shaft enclosing conduit or casing could be made the very means by which each one of these three necessary functions could be performed. He conceived that, by utilizing such a sectional enclosing conduit or casing, he had attained the very means for positioning the necessary series of intermediate bearings in place in alinement and for holding them in alinement. The bearings could be arranged at the adjoining ends of the sections of the shaft enclosing casing and supported by or as a part of the connectors which connected together the sec-

tions of such pipe or casing. This shaft-enclosing casing could be connected to the *water-discharge casing*, and thus form an integral structure adapted to be supported at the top of the well and hang pendent, like a plumb-bob.

The shaft-enclosing casing, *being an integral part of such pendent structure so hanging like a plumb-bob*, would thus be maintained in alinement and thus hold, *in alinement*, the shaft bearings and thereby the shaft.

By so mounting the many shaft bearings in such an enclosing casing, Mr. Layne was able to utilize such enclosing casing as a means of *protecting* the bearings from the destructive action of the sand, etc., in the water being pumped.

Mr. Layne also conceived the idea that this same shaft-enclosing casing could be utilized as the means *or conduit for conveying lubricant* to each of the bearings therein by providing for the feeding of the lubricant into the casing above the topmost bearing therein so that such lubricant would, by gravity, circulate or pass down between such bearing and the shaft and between each bearing and the shaft, thus lubricating all the bearings *in series*.

It is thus seen that Layne's conception was that the shaft-enclosing casing could be and should be made to perform the three functions of:

- (1) *Alinement* of shaft bearings.
- (2) *Protection* of shaft bearings from destructive

action of the sand, etc., in the water being pumped; and

(3) *Conduit for lubricant* for shaft bearings.

Having solved the problems of *alinement*, *protection* and *lubrication* by means of his shaft-enclosing casing, Mr. Layne was then in a position to carry out his underlying idea of a structure built up of units adapted to be assembled at the top of the well, and, when lowered into the well, to be supported from the top and hang pendent.

Such a structure, expressing and embodying Layne's *generic* invention, embraces:

A deep-well pump mechanism, adapted to be assembled, *unit by unit*, at the mouth of the well-bore and be successively lowered therein *a unit's length* after the addition of each succeeding unit and, when completely assembled and lowered, to *hang pendent* from the surface, like a plumb-bob; said mechanism consisting of, in combination:

- (1) A *pump* attached to a *sectional line or power* shaft extending to the top of the well.
- (2) A *pump* casing enclosing the pump impeller.
- (3) A *water discharge, sectional casing* connected to the pump casing and through which the pumped water passes to the top of the well.
- (4) A *sectional shaft-enclosing casing* extending from the pump casing to the top of the well

and said *shaft-enclosing casing* being adapted to:

- (a) Hold in *alinement* the line shaft by means of suitable *bearings* fixed within said casing at appropriate intervals.
- (b) To *protect* the line shaft and its bearings from wear or injury by any sand, grit or other bearing destroying detritus carried by the water being pumped; and
- (c) To form a *conduit for lubricant* from the top of the casing down through each succeeding bearing, including the lowest bearing, thus lubricating all said bearings *in series*.

To install such a structure, the *first unit*, embracing (a) the pump impeller casing, (b) the pump impeller therein, (c) a section of water-discharging casing, (d) a section of shaft attached to the pump impeller, and (e) a section of shaft-enclosing casing (having therein a shaft bearing) would be *assembled on the ground*, inserted in the well-bore and *held adjacent the mouth thereof* so that the *second unit* (embracing a section of water-discharge casing, a section of shaft and a section of shaft-enclosing casing, having therein a shaft bearing), could be joined to the *first unit*, whereupon such two units would be lowered about an unit's length into the well-bore and *there held* until the addition of a *third unit* identical with the *second unit*. The successive additions of

units, like the second unit, would then proceed until the desired length of structure had been assembled and lowered and the pump be at the desired depth in the well-bore, whereupon the whole structure would remain supported from the top of the well, hang pendent therein and function properly, *all without the necessity of man entering the well either to install, operate or repair the structure.*

The foregoing structure (*as so stripped of the various and sundry adjuncts and subsidiary non-essential features described in the Layne patent and covered by specific claims not in suit*) expresses and embodies Layne's *generic* invention covered by the *generic* claims 9, 13 and 20 herein held by Judge Dietrich and Judge Gilbert infringed by defendants' structure.

The said *generic invention* did not involve the inventing of any new mechanical elements. One of the chief merits thereof resides in the very fact that a *combination of elements*, expressing such *generic* invention, can be built up by the use of *standard* parts. In expressing such *generic* invention in *concrete* form, a mechanic can exercise a wide range of discretion and judgment in selecting, from the many well known and available forms thereof, for use in such a *concrete* expression, the particular design of pump impeller, the particular design of connection for the shaft sections, the particular design of shaft bearings, the particular design of coupling for the respective sections of the water discharge and the shaft-enclosing casings, the particular design of closure means for the bottom of the shaft casing, the particular design of

means for binding together, *into an integral structure*, the water discharge and shaft-enclosing casing, and so on.

In other words, Layne's *generic* invention is not inherent in or dependent upon the particular *form* of any one of said elements—it can be expressed in many different forms by the use of many different forms of its constituent parts or elements.

As said by the Circuit Court of Appeals for the Sixth Circuit, in *Yesbera vs. Hardesty Co.*, 166 Fed., 120, 125:

“The point to be emphasized is that the law looks not at the elements or factors of an invented combination as a subject for a patent, but only to the combination itself as a unit, distinct from its parts, . . . ”

This Court, in *Leeds & Catlin Co. vs. Victor Talking Machine Co.*, 213 U. S., 301, at p. 318, said:

“A combination is a union of elements, which may be partly old and partly new, or wholly old or wholly new. But, whether new or old, the combination is a means—an invention—distinct from them. . . . In making a combination, an inventor has the whole field of mechanics to draw from. This view is in accordance with the principles of the patent laws.”

It is thus apparent that Mr. Layne, having invented this broad, generically new combination, had the entire field of mechanics from which to select the details of construction of the respective parts or elements. His invention was not of a special form

or construction of any of these parts or elements, but, on the contrary, in the combination broadly. Many substitutes or "mechanical equivalents" existed for the several elements or parts. Mr. Layne's invention was the broad conception of such a generic combination.

The combination thus produced by Mr. Layne did not require a large diameter or wide-dug pit. It could be used in old wells where such pit existed, and thereby avoid man descending into the pit for any purpose, *or*, it could be used with equal advantage in the small diameter of a bored well, and avoid the necessity of providing a wide pit.

As said by Judge Dietrich in his opinion, Layne's invention is of a *fundamental, generic character*. This being true, Layne was entitled to cover and monopolize such generic invention by generic claims, not limited to the details of construction of the parts or elements and not limited to merely one species or form of his generic invention illustrated in his patent drawings or described in his specification. Mr. Layne complied with the patent laws when he showed in his patent specifications a form of his generic invention which would operate. He did not thereby limit himself to such specific form.

As said by this Court in *Hildreth vs. Mastoras*, 42 Sup. Ct. Rep., 20:

"It is not necessary, in order to sustain a generic patent, to show that the device is a commercial success. The machine patented may be imperfect in its operation; but if it embodies the generic principle and works, that is, if it actually and

mechanically performs, though only in a crude way, the important function by which it makes the substantial change claimed for it in the art, it is enough. *Telephone Cases*, 126 U. S., 1, 535, 8 Sup. Ct., 778, 31 L. Ed. 863; *Mergenthaler Linotype Co. vs. Press Publishing Co.* (C. C.), 57 Fed. 502, 505."

Although, as said by Judge Dietrich, Layne's invention, strictly speaking, was not a pioneer, nevertheless it was a *fundamental, generic* invention. As we shall point out hereafter, Claims 9, 13 and 20 are directed to this fundamental, generic invention, and are not limited to the particular mechanical form or shape of the elements.

As said by this Court, in *Winans vs. Denmead*, 56 U. S., 329, 341:

"It is generally true, when a patentee describes a machine, and then claims it as described, that he is understood to intend to claim, and does by law actually cover, not only the precise forms he had described, but all other forms which embody his invention; it being a familiar rule that, to copy the principle or mode of operation described, is an infringement, although such copy should be totally unlike the original in form or proportions. . . .

"Patentees sometimes add to their claims an express declaration, to the effect that the claim extends to the thing patented, however its form or proportions may be varied. But this is unnecessary. The law so interprets the claim without the addition of these words. The exclusive right to the thing patented is not secured, if the public are at liberty to make substantial copies of it, varying its form or proportions. And, therefore, the

patentee, having described his invention, and shown its principles, and claimed it in that form which most perfectly embodies it, is, in contemplation of law, deemed to claim every form in which his invention may be copied, . . . "

LAYNE'S PREFERRED FORM OF EMBODIMENT OF HIS GENERIC INVENTION, COVERED BY GENERIC CLAIMS 9, 13 AND 20, PLUS THE VARIOUS NON-ESSENTIAL ADJUNCTS ADAPTED TO BE USED THEREWITH AT THE OPTION OF ONE PRACTICING SAID GENERIC INVENTION.

A. ELEMENTS AND FEATURES EMBRACED IN EMBODIMENT OF LAYNE'S GENERIC INVENTION.

Having conceived his broad, generic "idea of means" or invention, it was then necessary for Mr. Layne to decide, according to his own judgment, upon the best *species* or *form* in which to express his generic "*idea of means*."

Every invention comprises an abstract "*idea of means*" expressed in concrete form. There is no idea that cannot be expressed in a number of ways, each expression thereof being the equivalent of every other expression of the same idea. This is universally true. For instance, the idea that an object is round can be expressed in a number of ways. The same idea may be expressed thus: Every point on the object's surface is equally distant from the center of the object. The same idea may be expressed in any of the foreign languages.

It follows, therefore, that there can be no generic expression of a generic idea.

This is true in connection with mechanical inventions. Where an inventor conceives an "*idea of means*," it is always possible to express said idea of means in many different concrete forms, each the equivalent of every other. This is true, no matter how narrow and restricted the idea of means may be.

It is, however, obvious that a broad, comprehensive generic "*idea of means*" can be expressed in a greater number of ways than can a narrow, restricted "*idea of means*." hence, the so-called rule of law that "*the range of equivalents varies with the scope of the invention.*"

As a matter of fact, said statement is not a "*rule of law*" but a "*law of nature*." Before any patent laws were ever enacted, it was true that a broad "*idea of means*" or, in other words, a *generic* invention, could be expressed in concrete form in more equivalent ways than could a narrow "*idea of means*" or specific invention.

Congress has recognized the existence of this "*law of nature*" that every invention can be expressed in many different concrete forms, each the equivalent of every other. We, therefore, find in Section 4888 of the Revised Statutes the following provision as to what an inventor must embody in his application for letters patent:

" . . . in case of a machine, he shall explain the principle thereof and the *best mode* in which he has contemplated applying that principle, . . . "

According to this section, an inventor is only required to describe, in his application for a patent, the "best mode" of embodying his "*idea of means*" in concrete form.

The Patent Office rules are to the same effect and the Patent Office does not require and does not permit an applicant to show, in his application, every possible form in which his invention can be embodied.

In view of the foregoing, an inventor need only show in his patent his *preferred form* of embodiment of his invention. When he has done this, he is entitled to *claim* his *actual invention* in whatever form it can be embodied.

Mr. Layne's *preferred form* of embodiment of his *generic* invention is illustrated in Figures 1, 2, 5, 7, 8 and 9 reproduced on the opposite insert.

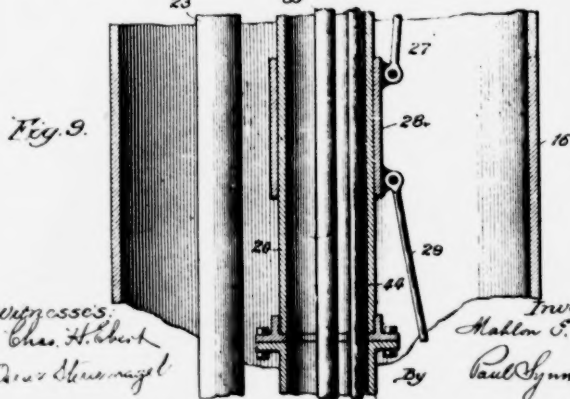
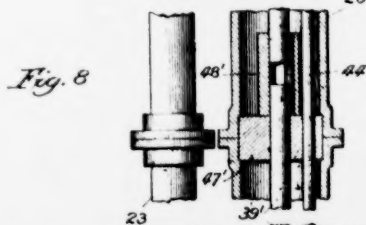
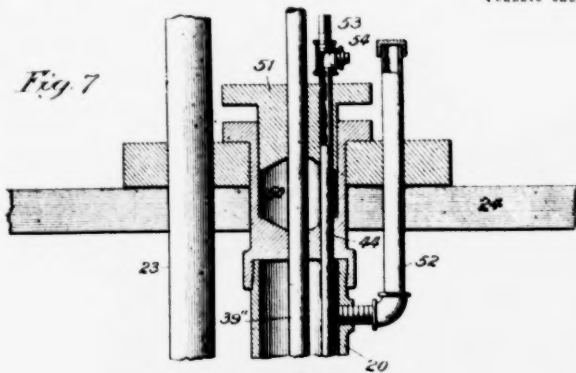
Figure 1 discloses an exterior view of the *shaft-enclosing casing* 20, extending from the top of the well to the pump impeller casing 21, together with the *water-discharge casing* or outlet pipe 23. It will be noted each of these casings is made up of a number of *sections*. As said by Layne: "The outlet pipe 23 is also preferably made in sections to correspond with the sections of the pump shaft casing" (p. 2, l. 108).

It will be also noted that the *shaft-enclosing casing* 20 and the *water-discharge casing* or outlet pipe 23 are *bound* together to form an *integral structure* which is supported at the top of the well in frame work 24 and thus said *integral structure* hangs *pen-*

M. E. LAYNE.
WELL MECHANISM.

APPLICATION FILED APR. 28, 1903

4 SHEETS-SHEET 3



Witnesses:
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PATENTED MAY 29, 1906.

M. E. LAYNE.
WELL MECHANISM.

APPLICATION FILED APR 28, 1903.

4 SHEETS-SHEET 1

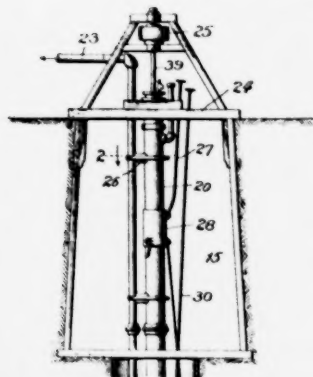


Fig. 2.

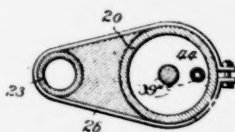


Fig. 1.

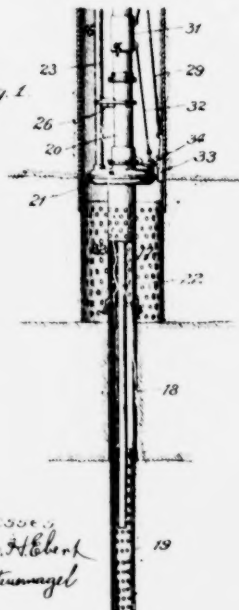
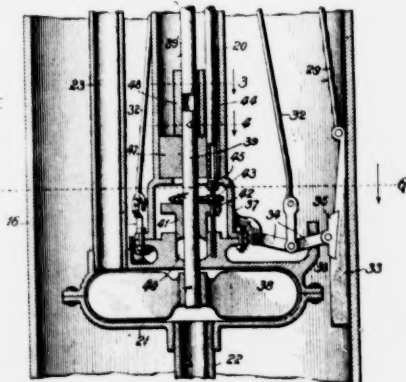


Fig. 5.



Witnesses
Chas. H. Clark
Geo. H. H. H. H.

dent, like a plumb-bob, in the well-bore which is lined with the casing 16.

As said on page 1 of Layne's patent, line 104:

"As shown in Figure 2, the shaft casing 20 and the outlet pipe 23, are *bound together* by means of the block-and-strap arrangement 26. These connecting devices are distributed at intervals along the length of the shaft casing."

In this Figure 1, a portion of one of the line shaft sections 39 is seen projecting from the top of the shaft casing and extending up to the drive-pulley 25.

In Figure 1, the water-discharge casing or outlet 23 is illustrated as eccentric to the shaft casing although, on page 2, line 124 of his patent, Mr. Layne states the water-discharge casing may be concentric with the shaft casing. This, however, is a mere matter of detail or form.

Also, in Figure 1, the pump mechanism is disclosed installed in connection with an old pit or chamber 15. Said pit serves no purpose and performs no function and Mr. Layne states, on page 1, line 88, that the well casing 16 may be extended to the surface and thus the pit of chamber 15, be dispensed with.

1. ALINEMENT

Figures 7, 8 and 9 disclose the interior of the sectional shaft casing 20, including the sectional shaft 39' and the shaft bearings 47', respectively supported in the shaft casing at the respective ends of adjacent shaft casing sections.

As said shaft casing 20 is an *integral part* of the whole structure which hangs *pendent*, like a plumb-bob, the *shaft casing* itself will so hang and thus hold in *alinement* the shaft bearings mounted within the casing and thereby maintain the shaft in *alinement*.

The bearings are arranged at proper distances apart along the shaft to hold the shaft in alinement. These bearings are enclosed by and form, in operative effect, a part of the enclosing casing. This casing is a metal pipe. It holds these bearings in place and in line. Thereby the shaft is held from whipping.

The majority of the Court of Appeals erred in that they misunderstood the mechanical facts. They say:

"It seems clear to us that the alignment is not a function of the shaft-casing, but it is a function of the means used for suspending the apparatus from the top of the well."

This is clearly error. To whatever "means" the majority opinion may refer, it is obvious that these respective bearings, spaced apart along the length of the line or power shaft, can only be effected through the shaft casing. Even were it granted that alinement is ultimately secured by the fact that the whole apparatus is pendent, still the mechanical fact remains that it is by means of the shaft-enclosing casing (part of such pendent structure) that the bearings are directly held in alinement.

The majority opinion in this respect is opposed to the findings of Judge Dietrich, of Circuit Judge Gil-

bert and of the Court of Appeals for the Fifth Circuit in the *Van Ness* case, where it is said:

"The third function performed by the shaft casing of the (Layne) patent in suit is that of *aligning the bearings and the pump shaft* so as to keep the latter in a vertical position in the well."

We submit, therefore, that the majority opinion of the Circuit Court of Appeals for the Ninth Circuit is in error in its conclusion that Layne's shaft-enclosing casing does not perform the function of holding the bearings in alinement to keep the power shaft alined. Said majority opinion says:

"Our conclusion is that the shaft casing has only two functions: (1) To protect the shaft and its bearings from the water and sand pumped to the surface, and (2) To enclose the means provided for lubrication of the shaft-bearings. The function of alignment is, therefore, dismissed from further consideration."

This error of mechanics leads to an erroneous conclusion.

A mere inspection of the Layne patent drawing shows that the shaft casing is supported at the top of the well and that it is an integral part of the *means* for supporting and suspending every other part of the apparatus located below the top of the well.

In other words, the shaft casing and the water-discharge casing form an integral structure, which is supported at the top of the well and, therefore, by *reason of gravity*, said casings hang in a vertical

plane. As the shaft bearings are mounted in the shaft-casing, said bearings necessarily are held in vertical alinement. As the shaft passes through such vertically alined bearings, it, too, must be held in a vertical line.

In view of the foregoing facts which, to us, seem most apparent, we are at a loss to understand such finding to the effect that Layne's shaft casing does not hold, in alinement, the shaft bearings and thereby maintain the pump shaft in a vertical line.

We can only attribute such finding to Judge Morrow's confusion of the various and very differently functioning casing mentioned in the Layne patent specification. In this Opinion, Judge Morrow says:

"We find also that the combination with a 'pump casing' mentioned in clause 2 of claim 9, the 'closed casing surrounding the pump shaft' mentioned in clause 5 of claim 9, the 'sectional casing' mentioned in clause 4 of claim 13, the 'casing being closed at the top' in clause 8 of claim 13, and the 'well casing' of clause 2, claim 20, by which the pump is 'entirely closed off from the water in the well' mentioned in the last two words of clause 4 and in clause 5 of claim 20, perform the same function. . . ."

In said quotation, *three* separate and distinct casings, respectively performing entirely different functions, are spoken of as being *one and the same thing and performing the same function*.

The "pump casing," of Claim 9, is numbered 21 in the Layne patent and, as clearly shown in Figure 1, is the casing that encloses the pump impellers. Obvi-

ously, said casing is not closed off from the water in the well. In order to operate the pump, the well water is permitted to enter the bottom of said casing 21 and said water, by the rapid rotation of the impellers within said casing, is forced out of said casing and up through the water-discharge pipe 23 to the surface of the ground.

The "closed casing," of Claim 9, is the shaft-enclosing casing numbered 20 in the Layne patent. This casing is supported at the top of the well and hangs pendent therein, like a plumb-bob. So hanging in a vertical plane, it maintains in vertical alinement the shaft bearings mounted therein, and thus maintains the shaft in vertical alinement. This casing also forms a conduit down through which the lubricant passes and lubricates, in series, the said shaft bearings. This casing also prevents the water and sand therein from coming in contact with the shaft bearings and thus destroying them.

The "well casing," of Claim 20, is numbered 16 in the Layne patent and forms an inner lining for the well-bore to prevent caving in of the ground surrounding the bore of the well.

In the above quotation, his Honor, Judge Morrow, has erroneously treated these *three separate and distinct casings* as one and the same thing. Therefore, in construing Claims 9, 13 and 20, he has treated these three distinct elements thereof as being only one element. This confusion of these various elements may have been the reason for much of the conflict between the majority opinion of the Circuit

Court of Appeals for the Ninth Circuit in this case, and the various prior decisions of the Circuit Court of Appeals for the Fifth Circuit.

2. LUBRICATION

Pipe 52 is a means by which the lubricant can be fed into the shaft casing above the first shaft bearing therein. Such lubricant will, by gravity, flow or circulate down through such first bearing and through each succeeding bearing within the shaft casing and finally pass out of the casing, at the bottom thereof, and into the pump casing 21, thus lubricating all the shaft bearings, in series. In such series lubrication of all the bearings therein, the shaft-enclosing casing merely functions as a *conduit for the lubricant* which enters the upper end thereof and passes down there through and through each bearing therein.

In order that the lubricant may so flow, *by gravity*, down and through each of the bearings within the shaft casing, an air-vent is provided at the top of the casing. The reason for having such a vent or air opening in the casing above the lubricant is precisely the same reason as that which prompts the housewife, when drawing coal oil from the spout at the bottom of a five-gallon coal-oil can, to make a hole in the top of the can to admit air above the coal oil and thus equalize the air pressures above and below the oil. If this were not done, a vacuous or no atmospheric pressure condition would be created above the oil in the can as the oil level was lowered. As the oil, at the spout of the can, would be subjected to

full atmospheric pressure it is apparent the oil would not freely flow out of the spout if the top surface of the oil, in the can, were not likewise subjected to an equal atmospheric pressure. As defined in the Century Dictionary and Cyclopedia a vent is "The opening in the top of a barrel to allow air to pass in as the liquid is drawn out." In the Layne structure, air will pass into the casing either through the stuffing-box 50, at the top of the casing, or through pipe 52, if the cap thereon be only loosely screwed on the pipe. Of course, this is a mere detail requiring no explanation to one skilled in the art and attempting to practice the Layne invention as disclosed in his patent.

3. PROTECTION

Protection of the necessary bearings for the line or power transmitting shaft 39' is provided by the *enclosing casing or pipe 20*. Necessarily, there must be a large number of these intermediate bearings. Each is completely shut off by the surrounding casing 20 from the water being pumped, so that such water cannot enter such bearing and carry sand, etc., therein whereby such bearing will be quickly destroyed. By means of enclosing casing 20, each of these intermediate bearings is entirely closed against the entry of water and sand to the bearings. The bearings are thereby saved from the destructive action of sand, etc., in the water being pumped.

In Figure 7, a stuffing-box 50 is illustrated as a closure means for the shaft-enclosing casing 20 at

the top thereof. In Figure 5, a stuffing-box, 40, is illustrated as a closure means for the shaft-enclosing casing at the bottom thereof. According to the fact and, as is well known in the world of mechanics, a stuffing-box operates as a bearing and, when used in connection with a high speed rotating shaft, the stuffing material therein cannot be maintained in such close or compacted relation with the shaft as to prevent the passage of all liquid between the stuffing and the shaft. Like every other type of bearing, the stuffing *must be lubricated or it will heat and burn, thus being destroyed*. The majority opinion of the Court of Appeals in this case shows the inherent error in mechanics in presuming that such a stuffing-box would form a complete closure against any liquid moving therethrough in either direction. It is upon such theory that the decision of non-infringement of the majority of said Court is based. Such finding is against the mechanical facts. This is illustrated, for example, by reference to the testimony of Mr. Layne himself in this case:

"MR. LYON—Q. You have shown a stuffing-box over 41, Figure 5; with such a stuffing-box around a small rotating drive shaft, what condition of closure could be maintained?

A. Only loose closure.

Q. Please explain to the Court a little more fully what you mean by that.

A. Any packing gland that is sufficiently tight or closed against a shaft so that it absolutely shuts out the flow of lubricant, whether it be water or oil, through the same, usually burns and becomes inoperative; the consequence is we must leave the

packing slightly loose, so that a sufficient amount of either water or lubricant passes through the packing gland in quantities so that the same is lubricated."

Therefore, the lubricant, fed into the upper end of the shaft-enclosing casing, will circulate or flow down through each succeeding bearing therein *and a substantial portion thereof, if not all thereof, will pass through stuffing-box 40 into the pump casing 21.*

This is one of the mechanical facts found by Judge Dietrich, his finding being based upon a consideration of the oral evidence adduced before him in connection with the demonstration of the various exhibits. He had full opportunity to observe the witnesses, consider their testimony, and did, in fact, take part in the interrogation of the witnesses on this point, as shown with reference to the testimony of Mr. Layne above referred to. See, for example, R., p. 605. The reversal of this finding of fact by the majority opinion of the Court of Appeals is, we submit, a violation of the rule laid down by this Court in *Adamson vs. Gilliland (supra)*. Judge Dietrich says:

"It was undoubtedly Layne's desire and purpose insofar as possible to exclude the water from the shaft casing, *but perfect mechanical inclosure of the shaft is, of course, unattainable*; it must protrude from the stationary casing to connect with the rotating propeller, at a point where the pressure of the water is the greatest, *and a bearing at that point so close fitting as to entirely exclude the water could not be lubricated, and hence would be impracticable.* The provision made by the patent is for a long bearing equipped with a

stuffing-box, which, in conjunction with the down pressure of the oil in the casing, serves under ordinary operating conditions, as an effective barrier to the sand, if it does not entirely exclude the water." (*Italics ours.*)

As said shaft casing encloses the shaft and its bearings from the pump casing to the top of the well, it will be noted the only passage, through which the water being pumped and the detritus therein can enter the shaft casing, is the passage from the pump casing up along the shaft through stuffing-box 40 and between the shaft and the lowest bearing 47 in the shaft casing.

Any *upflow* of such water and detritus through such passage will be effectually obstructed by the said bearing and the stuffing-box and by the *downflow* of oil therethrough. It is thus apparent that Layne's shaft-enclosing casing, *in co-operation with the downflow of oil therein*, performs the function of *protecting the shaft bearings from the destructive action of the sand and other detritus* carried by the water being pumped.

The foregoing elements and features constitute Layne's preferred form of embodiment of his *generic* invention.

The said elements and features constitute Layne's broad and revolutionary contribution to the art and form the basis for the wonderful commercial success of the Layne invention.

The said elements and features constitute a complete, operative structure. No other element, no ad-

junct and no subsidiary feature, described in the Layne patent, is essential to the operativeness of the above-described combination as an expression of Layne's *generic* "idea of means."

Therefore, *all the elements and features*, embraced in an embodiment of Layne's *generic invention*, may be described as follows:

ELEMENTS AND FEATURES EMBRACED IN EMBODIMENT OF LAYNE'S GENERIC INVENTION

A deep-well pump mechanism, adapted to be assembled, *unit by unit*, at the mouth of the well-bore and lowered, *unit by unit*, into the well-bore and, when completely assembled and lowered, to hang *pendent* from the surface, like a plumb-bob; said mechanism consisting of, in combination:

- (1) A *pump impeller* attached to a
- (2) sectional *line or power shaft* extending to the top of the well;
- (3) a *pump casing* enclosing the pump impeller;
- (4) a *water discharge sectional casing* extending from the pump casing to the top of the well and said *shaft casing* being adapted to;
 - (a) hold the line shaft in *alinement* by means of suitable bearings fixed within said casing at appropriate intervals;
 - (b) *protect* the line shaft and its bearings from

the destructive action of the detritus carried by the water being pumped;

- (c) form a *conduit for lubricant* from the upper end thereof down through each shaft bearing therein.

B.—VARIOUS NON-ESSENTIAL ADJUNCTS ADAPTED TO BE USED THEREWITH AT THE OPTION OF ONE PRACTICING LAYNE'S GENERIC INVENTION.

"*The Layne patent . . . did accomplish a revolution in the well-drilling industry,*" said the Court of Appeals for the Fifth Circuit. (*Getty vs. Layne*, 262 Fed., 141.)

It is quite natural, therefore, that when making such a revolutionary invention and launching it on uncharted seas, Mr. Layne should endeavor to provide for every possible contingency that might arise in connection with the operation or use of mechanism embodying his invention.

He could not foresee all the conditions of all actual uses; he could not foresee all that the public might or might not require or desire in respect to his radically new instrumentality.

Out of abundance of caution, Mr. Layne, therefore, devised many subsidiary features and adjuncts adapted to be used in practicing his *generic* invention. However, the use of same is purely optional. Mr. Layne's *generic* invention is not dependent on said adjuncts, *either for operativeness or novelty*.

The said adjuncts are only adjuncts and nothing

more. They are adapted to perform functions subsidiary to the major functions performed by an embodiment of Layne's *generic* invention.

The elements and features, constituting said adjuncts, are respectively covered by *specific* claims not sued on herein. None of the infringers of Layne's patent have seen fit to appropriate said adjuncts and, therefore, the *specific* claims, covering them, have not been litigated.

Defendants' counsel seem to derive much comfort from the fact that defendants have not also appropriated Layne's said adjuncts. This fact is true, we presume, simply because defendants find that their embodiment of Layne's *generic* invention is a commercial success without the presence of such subsidiary features.

Defendants' counsel state said additional features or adjuncts "were actually abandoned as commercially impractical." There is not a scintilla of proof on this point other than Mr. Layne's testimony to the effect that said adjuncts were not used simply because they were not essential to the *commercial* success of his *generic* invention.

In other words, said adjuncts are not impractical for performing the subsidiary, additional and minor functions intended to be performed by them but the public does not require that Layne's apparatus embody such *additional* features. His apparatus, *stripped* of such additional features, meets with public favor and, therefore, there has been no occasion to encumber it with said additional features, provided by him to

take care of certain minor conditions of possible use. In other words:

Layne "builded better than he knew."

As indicating the comprehensive scope of Layne's *generic* invention and as showing the objects attained thereby and by the many adjuncts and subsidiary features adapted to be used at the *option* of one practicing such generic invention, we quote as follows from page 1, line 8 of the Layne patent:

"My invention relates to the apparatus used for drawing water from driven or artesian wells, and particularly to the means for adjusting a pump therein. The objects of the invention are, to provide means by which the piping and the pump may all be assembled in proper shape before inserting it into the well; to provide means by which a pump may be placed in any desired position in a well, centered, raised or lowered and fixed in position by manipulating from the outside entirely; to provide means for adjusting the length of the piping leading from the pump to the surface at will and to lower the pump from time to time without taking it out of the well; to provide improved means for centering and fixing the pump in proper position in the well-casing; to provide improved means for manipulating the packing of the pump-shaft, and proper adjustment of the pump in place by means at the surface of the ground; to provide for the proper action of a pump without stopping up the well, so that water may be either flowed into or pumped out of the same at pleasure; to provide a superior mounting for a centrifugal pump in the well manipulated from the surface of the ground; to provide an extensible pump-shaft separately supported at intervals along its

length; to provide an automatic centering device for the pump in the well; to provide for mounting the pump and the shaft in a closed casing which is open to operate from the top; to obviate the necessity of making large wells for descending into them in order to arrange the pump, and to generally improve and cheapen the apparatus used for the above purposes.

"The above objects, as well as other advantages which will hereinafter appear, I attain by means of the construction and assemblage of parts as illustrated in *preferred* forms in the accompanying drawings, . . ."

In addition to the *automatic centering* of the pump structure within the well, by hanging said structure from the surface, like a plumb-bob, Mr. Layne also provides, as additional adjuncts, the wedges 33. These are adjuncts, pure and simple, and Layne refers to the use thereof as being optional (p. 2, line 105). They were not present in the respective structures heretofore adjudged to infringe Layne's *generic* claims.

Another Layne *adjunct* is one *not* intended to be utilized during the operation of the pump. Out of abundance of caution, Mr. Layne provided means whereby the shaft casing could, at intervals and if so desired, be cleaned out by the use of air forced into the tube, 52. During the normal operation of the pump, the lubricant would be fed into such pipe, 52. In order to make the compressed air effective in cleaning out the casing, it was deemed necessary to make the casing air-tight *during such cleaning operation*, which would necessarily be performed when the

pump was idle. *Of course, the casing cannot be kept air-tight during the operation of the pump.* In the feeding of the lubricant to the casing during the operation of the pump, air would enter therewith. Furthermore, the lower stuffing-box, 40, during operating periods, could not be maintained air-tight, *as the lubricant must pass down between the shaft and stuffing,* in such box, *in order to lubricate both, so the stuffing will not heat and thus be destroyed.* With the passage of lubricant between the stuffing and shaft, there would necessarily be a passage for air.

However, when the pump is idle and for the purpose of making the shaft-casing air-tight during the cleaning operation, the packing, in stuffing-box, 40, can be compressed and thus forced into closer relation with the shaft than is possible during periods of operation.

Also, during periods of idleness, the shaft-casing may similarly be kept air-tight for the purpose of maintaining the bearings in efficient lubricated condition. In respect to this feature, Mr. Layne says, at the end of his specification:

"I consider it of great *advantage also* to arrange the pump-shaft in a closed casing with stuffing-box at surface of ground at top of pump, so that by the use of the packing-boxes an air-tight chamber *can* be maintained, and water kept out of the casing, 20, *or* kept filled with clean liquid, *if desired*, thereby providing an efficient lubricating system for all bearings of the pump."

This paragraph of description sets forth and describes another ancillary feature or subsidiary invention *not inherent in or requisite to* Mr. Layne's *fundamental, generic* invention. It refers to a method by which the mechanism *can* be protected in a more nearly complete way than might be or has been found to be in most instances necessary. Where Mr. Layne's pumping mechanism was to be installed down in the well, where no one could get at it without pulling the whole structure up, and was to lie idle for material periods of time, it impressed itself upon Mr. Layne, that he should provide for every contingency, such as insuring these bearings effectual protection at all times, whether the pump was in actual operation *or* during possible long periods of idleness. It is to be noted in this connection, that in the *Van Ness* case, (213 Fed., 804, at 808), the Court of Appeals of the Fifth Circuit says:

"So it seems doubtful whether the defendant's pump-casing keeps the water from the shaft and bearings when it is not in operation, and the argument is that *in the rice country, where it is principally used, it remains out of service nine months of the year*. For these reasons, it is argued that the defendant's casing is not a closed one, even against water and sand. However, the record shows that protection against water and sand is afforded by defendant's casing to all but one of the bearings and to the shaft in the same degree as by that of the patented casing, at least during the period of the pump's operation, and that the protection afforded by defendant's casing is different only in degree from that afforded by the patented casing." (Italics ours.)

In the majority opinion of the Circuit Court of Appeals in this case, his Honor, Judge Morrow, has particularly referred (276 Fed., 471), to this paragraph of description and to this ancillary operation and invention. We submit that the majority of said Court, by this reference have shown their total misconception of Mr. Layne's fundamental, generic invention, and have inextricably confused in their minds and in said opinion, such fundamental, generic invention with the ancillary and subordinate improvements and inventions described by Mr. Layne in his patent and patented in other claims than Claims 9, 13 and 20. Mr. Layne, in his patent, showed and described a subordinate invention consisting of means by which the stuffing-box, 40, could be tightened or loosened from the surface of the ground. Evidently, this means was part of the means by which, when this ancillary or subordinate invention was to be utilized, the stuffing-box was to be closed down so tight that it could not be rotated without burning up, and, in such tightened up condition, would prevent the passage of air there-through. The very fact that Mr. Layne has provided this tightening means, (see Fig. 5 of drawings, and column 2, page 2, Layne patent specification, lines 66 to 81), we submit, conclusively shows that Mr. Layne, *as he has testified in this case*, never intended or thought that the stuffing-box, 40, could, *while the pump was in operation*, be set sufficiently tight to prevent the passage of fluid therethrough.

By "*clean liquid*," Mr. Layne evidently referred to oil. Now it is obvious that, *during periods of*

operation, Layne's shaft-bearings had to be lubricated. It will be noted, however, that said statement refers to two *alternative and optional conditions*. The *first optional condition* is that of maintaining the casing air-tight and keeping the water out. In such a condition, *with nothing but air in the casing*, the structure, necessarily, would *not* be in operative condition. The *second alternative and optional condition*, mentioned by Mr. Layne, is to keep the casing "*filled with clean liquid, if desired.*"

Certainly the use of lubricant, during operating periods, was not a *matter of option* but a *matter of necessity*. Yet in this paragraph, Layne refers to the *optional* use of a liquid within the shaft-casing. Such being true, such *optional* use could refer to only periods of idleness when one could keep the bearings in good lubricated condition, either, 1st, by keeping water out of the casing and relying on the lubricant adhering to the shaft and bearings after cessation of operations, to preserve same from corrosion, or, 2nd, by keeping the casing filled with clean liquid, "*if desired,*" thus providing for an efficient lubrication and preservation of the bearings during periods of idleness.

However, it is quite clear said paragraph merely expresses Mr. Layne's opinion as to the effect that he *considers* it of advantage *to be able* to maintain, in his apparatus, *one of the two alternative conditions* referred to. The creation of either of said conditions is, however, *a mere matter of option* and so specifically stated by Mr. Layne, who says, "*if desired,*" one

can do what he considers to be of advantage to be *able* to do. In said paragraph, Mr. Layne does not state that the shaft-casing, at any time, "*is*" kept air-tight or that it is necessary, at any time, to keep such casing air-tight. He merely says that he considers it "*also*" to be an advantage that said casing "*can*" (that is, at one's option) be kept air-tight for either of the purposes mentioned by him. In other words, the language used by him clearly characterizes such air-tight feature as being merely a non-essential adjunct. It must be obvious that the successful operation of Layne's revolutionary invention is not dependent upon any such minor feature as the compression of the stuffing in said stuffing-box, 40.

In the first place, the uncontradicted proofs show it would be impractical to maintain an air-tight joint between such stuffing and the shaft, when the latter is rotating during the pump's operation.

In the second place, the only result of not maintaining an air-tight joint, between the stuffing and the shaft, is the passage of lubricant therethrough. As said lubricant would have already performed its function of lubricating all the bearings within the shaft-casing, its escape therefrom would be *absolutely immaterial*. *There is no pretense to the contrary*. Furthermore, in passing down along the shaft through the stuffing-box into the pump-casing, such lubricant co-operates with the shaft-casing in preventing the entrance, into the shaft-casing, of the water being pumped and the detritus carried thereby.

In other words, such *outflow* of lubricant from

Layne's shaft-enclosing casing prevents any *inflow* of water and detritus in the opposite direction through the same passage. This is precisely what the Court of Appeals held *to be a fact* in the *Van Ness* case, where the Court said:

"... the oil is put in the apparatus at the top and passes (circulates) through the bearings from the top through the intermediate to the lower bearing, being retained for a time above each bearing and serving in this way not only to lubricate each bearing, *but also to help close the shaft-casing against the ingress of water and detritus.*"

It is obvious the downward flow and pressure of the lubricant in Layne's shaft-casing could not "*help close the shaft-casing against the ingress of water and detritus*" unless such lubricant was able to enter and pass down between the shaft and the lowest shaft-bearing and between the shaft and the stuffing in box, 40, along which passage, *alone*, the water and detritus would tend to enter the casing. In other words, the lubricant could not *obstruct* the ingress of water and detritus *up a passage-way*, unless the lubricant could flow *down such passage-way*.

It is, therefore, seen that the Court of Appeals' *finding*, in the *Van Ness* case, fully confirms the testimony of Layne herein to the effect that, during periods of operation, *only a loose joint* could be maintained between the stuffing in box, 40, and the shaft, thereby permitting the down-flow of lubricant from the shaft-casing into the pump-casing.

In view of said *finding of fact* and the said testi-

mony of Mr. Layne, it is apparent that the said paragraph, above mentioned, means that the shaft-casing "*can*" (at one's option) be kept air-tight, during periods when the pump is idle, thus clearly describing a non-essential adjunct. Even if it be assumed that said paragraph refers to operating conditions, nevertheless Mr. Layne makes it quite clear that such air-tight condition is purely optional by stating it "*can*" be produced, not that "*is or must be*" produced, by the *auxiliary* means described in his specification. On this point, Judge Dietrich said herein:

"It was undoubtedly Layne's desire and purpose in so far as possible to exclude the water from the shaft-casing, but perfect mechanical inclosure of the shaft is, of course, unattainable; it must protrude from the stationary casing to connect with the rotating propeller, at a point where the pressure of the water is the greatest, and a bearing at that point so close-fitting as to entirely exclude the water could not be lubricated, and hence would be impracticable. The provision made by the patent is for a long bearing equipped with a stuffing-box, which, *in conjunction with the down-pressure of the oil in the casing*, serves under ordinary operating conditions, as an effective barrier to the sand, if it does not entirely exclude the water . . .

"It is also earnestly insisted by defendants that the two systems are differentiated by the fact that their lubricating system is circulatory, while that of the plaintiff is static. In one or two of the decisions cited *supra* more importance is attached to this consideration than under the evidence here I have been able to accord to it. Under the facts

disclosed, the distinction is more apparent than real. *In both cases the oil is fed in at the top in substantially the same manner, and under the force of gravity traverses the entire length of the shaft-casing, lubricating all of the bearings in its course.* In the actual operation of the plaintiff's mechanism *there is necessarily some escape of thin oil through the bottom bearing;* for, as already explained, a perfect closure at this point cannot be maintained. Possibly a larger quantity will escape at the bottom of defendant's structure; but even there, it is to be borne in mind, the lubricant must traverse a bearing of considerable length before it reaches the groove, and to some extent its down-flow is resisted by the upward pressure of the water, which is only reduced and not wholly eliminated by the means described. Indeed, it is very probable that in both mechanisms a comparatively static condition is, under ordinary conditions, maintained at the lower end of the casing, due to the counter-action or counter-resistance of the columns of oil and water, one against the other" (R. 890; 894).

LAYNE'S GENERIC INVENTION SUMMARIZED

As said by Circuit Judge Gilbert in dissenting from the decision of the Circuit Court of Appeals in this case:

"There can be no doubt that the appellee's invention did, as was said in the case of Getty vs. Layne (C. C. A.) 262 Fed., 141, 'accomplish a revolution in the well-drilling industry'. And while the invention may not be said to be of a pioneer character, it is, nevertheless, an invention of such merit as to be entitled to protection against a reasonable range of mechanical equivalents. In both the appellee's and appellants'

mechanisms the oil is introduced at the top in substantially the same manner, and by gravity it traverses the entire length of the shaft, thereby lubricating all the bearings. In both there is some escape of oil through the lowest bearing. *The contention that the two systems are differentiated in that the appellee's lubricating system is static, while that of the appellants' is circulatory, is not sustained by the proofs.* In the appellants' mechanism, the shaft-casing being made impervious to water and packed with hard cup grease a distance above and below each bearing, the ingress of water is prevented, and the movement of the lubricating oil is impeded, so that there is no substantial difference in the operation of the two lubricating systems. Both use a closed casing surrounding the pump-shaft from the pump to the top of the well, the casing being sufficiently closed to allow the feeding of a lubricating fluid down through the same to the various bearing parts for the shaft therein. Both accomplish the same result by substantially the same means, operated in substantially the same way. The fact that the appellants' static lubricants are supplemented by the use of an emulsifying oil is unimportant. The fact that in the appellants' mechanism more oil escapes from the lowest bearing than in the appellee's is also unimportant. The ultimate disposition of the lubricant after its office is fulfilled is immaterial. These differences do not enable the appellants to appropriate the substance of the appellee's invention.

"In brief, the evidence shows that the appellants, as does the appellee, use a deep well pump mechanism assembled unit by unit, and lowered into the well-bore so as to hang from the surface, the mechanism consisting of: (1) A pump-impeller attached to a sectional power shaft extending from the pump to the top of the well, and inclosed in

a casing; (2) a water-discharge sectional casing extending from the pump-casing to the top of the well; (3) a sectional casing extending from the pump-casing to the top of the well, provided at the end of each section with a fixed block, with bearings for the shaft closed at the top, the casing being adapted to hold the power-shaft in alignment by means of the bearings to protect the power-shaft and its bearings from injurious action of sand or soil in the water, and to form a means for conducting lubricant from the top down through each shaft-bearing. (Italics ours.)

As said by District Judge Dietrich:

"As frankly stated by counsel for the defendants, the issue is a narrow one, 'the chief question being one of infringement,' and the task is to determine the nature and scope of the plaintiff's patent and compare it with the defendants' structure. The problem of the inventor was not a new type of pump or pump runner, but, broadly speaking, how to install an existing rotary type—preferably centrifugal—operate it, withdraw it for repairs, and replace it, without the necessity of a man entering the well. And, of course, to be practical, the device must, under ordinary operating conditions, be efficient and reasonably durable. Layne's conception was of a jointed or sectional mechanism, providing, when assembled, a driving shaft, connecting the pump-runner at the bottom of the well with the actuating power at the surface, a continuous enclosing casing for the shaft, and a conduit through which the water is pumped to the surface, the sections to be of any desired length and added one at a time as the pump is lowered in the well, the assembled mechanism finally to hang pendant from supports at the surface. He suggests that the driving-shaft and its casing may be carried upon the outside of the water conduit

or within, but in either case the two are to be attached together at intervals to give increased strength and rigidity. An ingenious provision by which the pump or propeller-casing may be wedged in and made immovable at any point in the well by operating a lever at the surface is covered in some of the claims, *but the feature is not a part of the generic idea, and is not presently involved.* In practice the wedging was found to be unnecessary and has never been used. *An essential part of the main problem was to provide bearings to hold the driving-shaft in alignment together with means for lubricating them and keeping them free from the sand more or less generally carried in the water.* In the inventor's conception, these three functions were to be performed by the shaft-casing. Reinforced by the conduit-casing to which it is attached and subject to the pull of the pendant weight, it would serve as a rigid footing for the requisite bearings. Being substantially water-tight, it would keep the sand out and at the same time serve as a conduit through which to furnish oil to the bearings. It was undoubtedly Layne's desire and purpose in so far as possible to exclude the water from the shaft-casing, *but perfect mechanical inclosure of the shaft is, of course, unattainable;* it must protrude from the stationary casing to connect with the rotating propeller, at a point where the pressure of the water is the greatest, *and a bearing at that point so close-fitting as to entirely exclude the water could not be lubricated, and hence would be impracticable.* The provision made by the patent is for a long bearing equipped with a stuffing-box, which, in conjunction with the down-pressure of the oil in the casing, serves under ordinary operating conditions, as an effective barrier to the sand, if it does not entirely exclude the water." (Italics ours.)

Plaintiff's expert, William A. Doble, Sr., summarizes the main patent in suit (R., p. 824) as follows:

"A. With reference to these points, the patent provides in combination a shaft-enclosing tube associated with the bearings, forming a conduit to furnish lubricant to the several bearings in series. It further provides a protection, in combination with the bearings surrounding the shaft and protecting the bearings and the shaft from the action of the water being pumped and any sand or detritus carried by the water. Furthermore, this combination provides a series of shaft-supporting and aligning bearings placed at suitable intervals between the ends of the shaft, making one combined structure, being a pendant power transmission to transmit power from the surface of the ground or the top of the well to a pump located within the bore of the well. That is, it provides in this combination a support and alignment of the bearings, a lubricating system for the bearings in series, and a protection of the shaft and bearings against the corrosive action of the water or any sand or detritus carried by the water."

INVENTION

"TO OBTAIN ABSOLUTE SIMPLICITY IS THE HIGHEST TRAIT OF GENIUS."

The extreme simplicity of Mr. Layne's solution of the various problems that confronted him, emphasizes the novelty of his conception and the high order of invention exercised by him. It is a well-known fact that progress, in every art, is from the *complex to the simple*. There is nothing so complex as abso-

lute simplicity. This is so generally recognized in the world of mechanics that the Circuit Court of Appeals for the First Circuit, in *Dececo Co. vs. Gilchrist Co.*, 125 Fed., 293, summing the matter up, said:

"To obtain absolute simplicity is the highest trait of genius."

As said by his Honor, Judge Gilbert, in *Kitchen vs. Levison*, 188 Fed., 659, Judges Morrow and Wolverton concurring:

"It is urged that the improvement which the appellee made on the prior art was simple and obvious. It may be conceded it was simple, but that fact alone does not deprive the invention of patentability. *There may be the highest form of invention in some of the simplest improvements on the prior art.*"

An "idea of means" or invention is not to be judged by the simplicity of any particular concrete expression thereof. Although a simplicity of expression is ever a desideratum and sometimes the chief merit of an invention, nevertheless an invention should be judged *by the results accomplished thereby* in furthering the interests of mankind.

Also, the fact that an "*idea of means*," or invention, may be expressed by making slight mechanical changes in prior art devices neither detracts from the merits of the invention nor necessarily tends to limit or narrow the scope or breadth of the inventive idea of means. By making a slight mechanical change

in an existing device, it frequently happens that failure is converted into success; that a *broadly new idea of means* is thereby expressed. The books are full of such instances.

"Slight changes in appearance may bring about radical changes in results. Invention is not to be slighted because the changes are slight."

In the case of *United States Fastener Co. vs. Bradley*, 149 Fed., 222, the Court of Appeals for the Second Circuit said:

"This Court has repeatedly upheld patents for similar improvements, the test being not the simplicity of the device, *but the difficulties overcome and the results accomplished.*"

Mr. Layne's changes in and additions to prior art devices brought about "*radical changes in results.*"

"*The Layne patent . . . did accomplish a revolution in the well-drilling industry.*"

said the Court of Appeals in *Layne vs. Getty*, *supra*.

Layne's invention and the scope thereof, are, therefore, not to be judged and measured in terms of *mechanical changes* from prior art structures, but "*in terms of principle of operation and results accomplished.*"

So judged and measured, it is apparent Mr. Layne made a broad, fundamental invention; disclosed to the world a broadly new "*idea of means*" capable of being expressed in many different forms and of accomplish-

ing radically new results and thereby "*accomplished a revolution in the well-drilling industry.*"

CONSTRUCTION OF GENERIC CLAIMS 9, 13 AND 20, HELD
INFRINGED BY DEFENDANTS' DEVICE

The fundamental rule of claim construction is that a claim, if possible, should be construed to cover the *actual and entire* invention of the patentee. As said by Judge Hawley, in speaking for the Court, in *Los Angeles Art Organ Co. vs. Aeolian Co. et al.*, 143 Fed., 880, 885, Judges Gilbert and Morrow concurring:

"The claims of a patent should be construed, where they reasonably may be, to cover the entire invention of the patentee; and where a patent contains several claims, some of which are limited to details, the others are prima facie, not to be restricted by insisting that they contain, as necessary elements, the particulars which are specifically covered elsewhere. The general rule is as stated by the Court in Risdon I. and L. Works vs. Trent, 92 Fed., 375, that 'infringement cannot be avoided by reading into a broad claim of a patent specific devices claimed in narrower claims of the patent.' See also Mast Foss & Co. vs. Dempster Co., 82 Fed., 327, 27 C. C. A., 191; Bresnahan vs. Tripp G. L. Co., 102 Fed., 899, 43 C. C. A., 48."

The fundamental, generic combination, containing the essence of Mr. Layne's invention, is the subject matter of claims 9, 13 and 20 of the patent in suit. A simple reading of these claims is sufficient to show that the Commissioner of Patents did not require,

and that it was not Mr. Layne's intention, to confine his claim of invention or the scope of his patent either to the wedge system or to any of the other details of improvement. These claims are as follows:

"9. In well mechanism the combination with a pump-casing, of a rotary pump of a jointed pump-shaft and a closed casing surrounding the pump-shaft from the pump to the top of the well."

"13. The combination with a pump and its actuating shaft of a sectional casing therefor provided at each end of each section with a fixed block with bearings for the shaft, the casing being closed at the top and provided with an air vent."

"20. The combination of a well-casing, a rotary pump therein, and a line shaft for the pump entirely closed off from the water in the well."

In construing or interpreting these claims, it is essential to bear in mind the Layne invention to which they are addressed. For, as said in *Towne vs. Eisner*, 245 U. S., 418:

"A word is not a crystal, transparent and unchanged; it is the skin of a living thought and may vary greatly in color and content according to the circumstances and the time in which it is used."

and as said by the Circuit Court of Appeals for the Second Circuit in *Carlson Motor and Truck Co. vs. Maxwell Briscoe Co.*, 197 Fed., 309, at p. 315:

"The question is not one of nomenclature, but of mechanics, and relates not to the names given to the parts of the combination, but to the various functions they perform."

So, in construing or interpreting the claims of a patent, care must be taken to give effect to the objects and purposes of the patent statutes. As said in *Topliff vs. Topliff*, 145 U. S., 156:

"The object of the patent law is to secure to inventors a monopoly of what they have actually invented or discovered, and it ought not to be defeated by a too strict and technical adherence to the letter of the statute, or by the application of artificial rules of interpretation."

and in *Klein vs. Russell* (19 Wall., 433):

"The Court should proceed in a liberal spirit, so as to sustain the patent and the construction claimed by the patentee himself, if this can be done consistently with the language which he has employed."

Bearing in mind then that Mr. Layne's novel conception resided primarily in the enclosing of the line or power-shaft a conduit extending from the top of the pump to the top of well and that the function of such conduit was three-fold, towit: (1) to support and align the bearings and thereby hold the line or power-shaft in alignment; (2) to protect such bearings from the cutting or destructive action of sand, etc., carried by the water being pumped, and (3) to provide a conduit for lubrication of the bearings in series, each of these claims must be construed in the light of such fundamental, generic invention. Each element named in the claim must be so considered that it will have the functions and perform

such functions in accordance with Mr. Layne's conception. The combination, expressed by each of these claims, must be a combination of the named elements so that such elements will co-operate together to perform their respective functions in accordance with Mr. Layne's conception. When so considered and construed, each of these claims is clear and concise and their breadth apparent. When so construed they negative *any intention* upon the part of Mr. Layne in making them or of the Patent Office in allowing them *to limit such claims to non-essential features*.

As said in *Rubber Co. vs. Goodyear*, 9 Wallace, 788:

"A patent should be construed in a liberal spirit, to sustain the just claims of the inventor. This principle is not to be carried so far as to exclude what is in it, or to interpolate anything which it does not contain. But liberality, rather than strictness, should prevail where the fate of the patent is involved, and the question to be decided is whether the inventor shall hold or lose the fruits of his genius, and his labors."

As said by the Circuit Court of Appeals for the First Circuit in *Mossberg vs. Nutter*, 135 Fed., 95, at p. 99:

"In confining our attention too exclusively to a critical examination of the claims, we are apt to look at them as separate and independent entities, and to lose sight of the important consideration that the real invention is to be found in the specification and drawings, and that the language of the claims is to be construed in the light of what is there shown and described."

The Circuit Court of Appeals for the Sixth Circuit in *Stillwell-Bierce & Smith-Vaile Co. vs. Eufaula Cotton Oil Co.* et al., 117 Fed. 410, at p. 414, said:

"While it is the purpose of the statute to require the inventor to set forth the nature and extent of his patent, and it is not the province of the Courts to add to or take from a claim that which is not embraced within its language, nevertheless we may look to the specifications for the purpose of construing the language used in the claim. If this language includes an element only described in general terms, we may look to the specifications to ascertain its meaning. *Sochner vs. Range Co.*, 28 C. C. A. 317; 84 Fed. 182; *Lake Shore & M. S. R. Co. vs. National Car Brake Shoe Co.*, 110 U. S., 229, 4 Sup. Ct. 33, 28 L. Ed. 129."

The Circuit Court of Appeals for the Eighth Circuit, in *Brammer vs. Schroeder*, 106 Fed. 918, at p. 929, speaking of the interpretation of claims, says:

"It is true that neither they nor the specification can be read to expand the claim; but the specification and the drawings must be read together, and given their obvious force and meaning, for the purpose of determining what devices are pointed out and described therein. When the specification and drawings of this patent are so read, the extension of the driving shaft beyond the pinion so that it will engage with the flange on the cylinder, and every other mechanical device requisite to unite the essential elements of the combination claimed, and to make it complete and operative, are plainly pointed out and described."

In *American Sulphite Pulp Co. vs. Howland Falls Pulp Co.*, 80 Fed. 395, the Circuit Court of Appeals

for the First Circuit says that the claims and the specifications are to be read together, not for the purpose of enlarging the invention, as stated in the claims, but "for the purpose of better understanding the meaning of the claim and the extent of the invention, and the object of the inventor."

As said by this Court, in *Brooks vs. Fiske*, 15 How. 212:

"The claim, or summing up, however, is not to be taken alone, but in connection with the specification and drawings the whole instrument is to be construed together. But we are to look at the others only for the purpose of enabling us correctly to interpret the claim."

That the claims of a patent must be read in the light of the specification; that the specification may always be referred to to restrict, though not to expand nor broaden the claims. See *Anderson vs. Collins*, 122 Fed., 451, C. C. A., 8th Circuit.

Having before it a patent in which the words of the claims were general and indefinite, the Circuit Court of Appeals for the Seventh Circuit, in *Seiler vs. Fuller & Johnson Mfg. Co.*, 121 Fed., 85, at p. 89, says:

"To sustain the validity of Claims 1 and 2, it is necessary, therefore (*Westinghouse vs. Boyden Power Brake Co.*, 170 U. S., 537, 558; 18 Sup. Ct., 707, 717; 42 L. Ed., 1136), 'To refer back to the specification; not, it is true, for a slavish adoption of the identical instrumentalities therein described, but for the understanding of the essential and substantial features of the means therein illustrated.'"

That it is entirely proper, in interpreting the broad and general language in claims, to refer to the specification and confine the meaning of the language of the claim to such a combination and to such elements as will produce the desired result with the elements functioning in the manner of the inventor's conception is set forth in *Robinson on Patents*, Vol. II, page 498:

"In thus construing the claims of a patent by its descriptive portions, the scope of the claims may often be restricted, but can never be enlarged. The claims are based on the description, the invention secured to the patentee being always identical with or contained in that communication to the public; and therefore the interpretation given to the claims must limit them to the invention previously described, however wide and comprehensive they might otherwise appear."

In the case of *Anderson vs. Collins*, 122 Fed., 451 (*supra*), the patent related to a roller bearing and the tenth claim defined "*roller elements* located in the race formed thereby, *ball-separating devices* between the roller elements of the housing, for confining the roller elements." The prior art was such that the claim was anticipated unless the *roller elements* were construed narrowly to be *balls* and not wheels or cylinders, and unless the ball-separating devices were construed to be *rotating* ball-separating devices. The Court, in order to save the claim, construed the roller devices to be ball-roller devices, and the separating devices

to be rotating separating devices. The Court's statement as to this question is as follows:

"Much has been said in argument and written in the briefs to show that the tenth claim of the patent in suit is so broad and general in its terms that it covers devices in which the main bearing elements are cylinders or wheels, and in which the separating devices are not rotatable; and that, when it is read in this way, the combination it describes is anticipated by several of the patents to which reference has been made. But the claims of a patent must be read in the light of the specification which accompanies them. *The specification may always be referred to to restrict, though not to expand the claims.* And, when this tenth claim is read in the light of these familiar rules, its true construction limits it to a housing for the balls and the rotatable separating devices between them described in the specification; and when it is thus read no anticipation can be found in the prior patents."

The Court of Appeals of the Sixth Circuit (Lurton, Day and Severns sitting), has also enunciated the same principle very emphatically in the case of *Lamb Knit Goods Co. vs. Lamb Glove & Mitten Co.*, 120 Fed., 267. In that case the subject matter involved was a glove, and the prior art was such that, unless the glove was construed to be a *knit* glove, the claim was anticipated by the prior art. Claim 1 did not specify a *knit* glove or knit fabric, but read as follows:

"1. A glove formed of two blanks, the hand blank having finger pieces formed thereon, and narrowed at the point where the thumb is attached,

and of a uniform width from the thumb to the wrist, and the thumb blank having its upper portion knit goring, substantially as described."

The Court held that, in view of the specification and the drawings, the claim should be construed narrowly to refer to a *knit* fabric, such construction being given in order to save the claim from anticipation. The Court's statement in the case is as follows:

"It is the settled rule in patent law that claims must stand or fall as made (*Keystone Bridge Co., vs. Phoenix Iron Co.*, 95 U. S., 274, 278, 24 L. Ed., 344); but it is equally well settled that the claims of a patent are to be construed by reference to the specifications (of which the drawings form a part), and that such reference may be had, not for the purpose of expanding the claim, but for the purpose of defining it and limiting it to the description of the invention (*McClain vs. Ortmyer*, 141 U. S., 419, 12 Sup. Ct. 76, 35 L. Ed., 800; *Howe Mach. vs. National Needle Co.*, 134 U. S., 388, 10 Sup. Ct., 570, 33 L. Ed., 963; *Coupe vs. Royer*, 155 U. S., 565, 15 Sup. Ct. 199, 39 L. Ed., 263; *Tilghman vs. Proctor*, 102 U. S., 729, 730, 26 L. Ed., 279). And within certain limits the Courts are inclined to adopt this mode of construction when it is necessary, as in the present case, to save the patent from the objection that the claims are too broad. *Rubber Co. vs. Goodyear*, 9 Wall. 788, 795, 19 L. Ed., 566; *McClain vs. Ortmyer*, *supra*; *Coupe vs. Royer*, *supra*, 577; *Sochner vs. Stove Co.*, 28 C. C. A., 317, 84 Fed. 182."

This Court has squarely and unequivocally indicated that it approved of the doctrine of construing claims more narrowly than their terms, in view of the speci-

fication. *Carnegie Steel Co. vs. Cambria Iron Co.*, 185 U. S. 403. The process of the patent in suit in that case referred to the mixing of metal from blast furnaces, but the second claim said nothing about metal from blast furnaces, but merely specified "the art of mixing molten metals to secure uniformity of the same in its constituent parts preparatory to further treatment." The Court held that the specification should be referred to to ascertain the character of the metal, and that the metal should be construed to mean metal from *blast furnaces* and not from *cupolas*, there being considerable question, in view of the art, as to the validity of the claim if construed broadly enough to cover the mixing of metal from cupolas. We quote below the statements of the Court upon this point.

"The second claim apparently extends to the art of mixing all molten metals, but the specification, taken in connection with the disclaimer, which describes a process designed to dispense with the use of cupolas, shows that it was intended to include metal tapped from blast-furnaces and was probably intended to be limited to that. Whether the claim would be void if construed to include cupola metal, it is unnecessary to consider. *It clearly includes metal from blast-furnaces, and is not rendered void by the possibility of its including cupola metal. The claim of a patent must always be explained by and read in connection with the specification, and as this claim clearly includes metal taken from blast-furnaces, the question whether it includes every molten metal is as much eliminated from our consideration in this case as if it were sought to show that the word 'metal'*

might include other metals than iron. Were infringement charged in the use of an apparatus for mixing cupola metal, the question would be squarely presented whether the claim had been illegally expanded beyond the specification."

It will be noted from the foregoing language that the Court had no hesitation in referring to the specification and, in view of such specification, holding that the metal in the claim must be construed not only to mean metal *from blast-furnaces*, of which the claim made no mention, but also that it had no hesitation in construing such metal to be *iron*, although the claim made no specific mention of such limitation.

The same policy, as to construction, is set forth in a later decision, *Brill and The J. G. Brill Co. vs. The Washington Railway & Electric Co.*, 215 U. S., 527. Mr. Justice Holmes, who delivered the opinion, said:

"At the argument it was admitted that the plaintiff's case must stand or fall on claim 13 of No. 627,898. In that claim the only possible element of novelty is the mode in which the semi-elliptic springs are suspended from the side frames. *In practice the links are elastic and the pins on which the whole combination hangs have a universal ball-and-socket movement, although the claim only says 'movably and resiliently suspended substantially as described.'* Neither '*movably*' nor '*resiliently*' indicates the ball-and-socket arrangement, but it is described in the specification and we give the plaintiff the benefit of the doubt."

thus indicating the willingness of the Court to con-

strue the term "*movably*" to mean the ball-and-socket movement described in the specification.

The case of 1900 *Washer Co. vs. Cramer*, 169 Fed. 629, is on substantially all fours with the present case. In that case Judge Gray delivered the opinion of the Court (Dallas and Buffington sitting with him) and admitted that the terms of claim 1 of the patent in suit were fully met by the standard washer, or by the Wearne tub "*if we stick in the bark, by looking at the language of the claim, dissociated from the specifications; but no invention can be practically or fairly understood or explained, if such dissociation is absolutely adhered to*" (169 Fed. 632), but the claim was nevertheless held valid over such prior art which met it *in terms*. The Court held that the "means for actuating said lever," referred to in the claim, must not be taken to mean any means such as impractical hand power applied to the lever, but must be construed to be the "efficient practical means described in the specification."

The point to be emphasized is that, when a claim recites an element by a certain name, the Court will apply to the "specification," i. e., drawings and description, to give effect to the inventor's language in his claim. For example, if he calls for a "closed casing" the Court will ascertain for what operative function and result he includes a "closed casing" as a part of the combination claimed,—What its purpose in the combination is—How it performs its purpose

or function,—and, What is its operative relation to the other elements of the claim, in order that the claim may be interpreted to call for the invention sought to be patented to the end that the final meaning shall not “lose sight of the important consideration that the real invention is to be found in the specification and drawings, and that the language of the claims is to be construed in the light of what is there shown and described (*Mossberg vs. Nutter, supra*).

What then is the true meaning and scope of claims 9, 13, and 20?

CLAIM 9

In words claim 9 specifies that it embraces “in well mechanism,” “the combination” with

- (1) a pump casing of a rotary pump,
of
- (2) a jointed pump shaft,
- (3) a closed casing surrounding the shaft from the pump to the top of the well.

In construing and understanding this claim, it is to be first noted that the combination is complete by commencing at the top of the pump and embracing the “well mechanism” “to the top of the well.” In other words, the active part of Mr. Layne’s invention was the mechanism for supporting the pump and “well mechanism” pendent from the top of the well to wit: the means suspending and operating the pump. The

claim embraces these means by denominating them "a jointed pump shaft" and "a closed casing surrounding the shaft from the pump to the top of the well."

The words "jointed shaft" clearly specifies a power shaft made up in sections joined together. The implication necessarily is present that the shaft is to be of such length that a one-piece shaft would be impractical. Hence this claim is by its terms "limited" to a combination in which the power shaft is composed of sections.

Merely to surround such shaft between the top of the pump and the top of the well with a pipe would perform no useful purpose whatsoever. The law never presumes a futile thing. Mr. Layne must have intended more than mere futility. When he used in this 9th claim the words "a closed casing" he intended and meant "a closed casing" *for the purposes and having the attributes and functions of the shaft enclosing conduit or casing 20 of his drawings and description.* Such "closed casing" combined the performance of the three purposes or functions of (1) supporting and aligning the bearing, (2) protecting the bearings from the sand, etc., carried by the water being pumped, and (3) formed a conduit for the lubrication of the bearings in series. And this is the kind of "closed casing" called for by the claim. It is thus apparent that this claim covers Mr. Layne's generic conception and combination.

As said in *Robbins Conveying Belt Co. vs. Ameri-*

can Road M. Co., 145 Fed. 923, where the meaning of the language was in the claims of a patent is doubtful, or is susceptible of two different constructions, the specification and drawings may be properly referred to for the purpose of ascertaining the true construction of the claims, and as said by this Court in *Brown vs. Guild*, 90 U. S., 181:

"The first of these claims, if construed simply as claiming the placing of the seed-dropper on the machine, would probably be void, as claiming a mere result, irrespective of the means by which it is accomplished. But if construed as claiming the accomplishment of the result by substantially the means described in the specification, it is free from that objection; and we ought to give a favorable construction, so as to sustain the patent if it can fairly be done."

And in this latter case this Court further says:

"A literal construction is not to be adopted where it would be repugnant to the manifest sense and reason of the instrument."

When Mr. Layne in claim 9 specified as a part of the combination therein claimed "a closed casing," etc., it is clear that he meant the kind of a closing casing and a closing casing performing the function described in the specification. It is undoubtedly the meaning or interpretation which the courts will give to this language of the claim. Particularly is this true as thereby the claim will be made true to Mr. Layne's invention and the validity of the patent sustained

thereby instead of accusing Mr. Layne of specifying a mere enclosure of the power shaft without such enclosure having any beneficial function or result whatsoever.

CLAIM 20.

In claim 20 Mr. Layne has expressed his general combination in slightly different language. He calls therein for three elements: (1) a well casing; (2) a rotary pump therein; and (3) a line shaft for the pump entirely closed off from the water in the well. Again we must refer to the drawings and specifications for the purposes, attributes and functions of closing the line shaft from the water in the well. It is perfectly apparent that this was the problem before Mr. Layne in order to make his *pendent* conception successful. The claim, therefore, necessarily implies that the line shaft or power shaft of the pump shall be enclosed in a conduit of the kind and for the purposes set forth in the Layne invention as disclosed by the drawings and description of the patent. *That is to say, an enclosing conduit having the three functions heretofore adverted to.* It is to be noted, in this connection, that this claim differs from claim 9 in that the line shaft is not specifically referred to as jointed or sectional.

The purpose of this closure of the line shaft is inherent in the combination thus expressed in these claims. It is a closure for the three purposes or func-

tions of, (1) supporting and aligning the bearings; (2) sufficient closure to prevent the sand, etc., carried by the water being pumped from destroying the bearings; and, (3) sufficient closure to allow the feeding of a lubricant down through the enclosing conduit from bearing to bearing,—*series* lubrication. *Absolute closure is not essential nor is it mechanically possible to absolutely close the conduit at the pump neck from some water seeping through when the pump is idle. Such water, however, will be free from sand. Sand, etc., is only carried when the pump is in operation. Nowhere in Mr. Layne's specification has he insisted that absolute closure against water at all times must be or can be provided.*

No intention is found in either of these claims to limit his claim of monopoly solely to the particular form or construction shown or described. No intention to limit his claim to the particular or identical form of elements illustrated in his drawings. Therefore, when referring back to the specification (drawings and description), "for the understanding of the essential and substantial features of the means therein described" the Court is not required to limit the claim to "a slavish adoption of the identical instrumentalities therein described" (Seiler vs. Fuller, 121 Fed. 85, supra), but will look at the real substance of the Layne invention in accordance with its revolutionary novelty and importance.

As said by the Court of Appeals for the Seventh

Circuit, in *Columbia Wire Co. vs. Kokomo Co.*, 143 Fed. 116, 124:

"The object of the law authorizing the grant is to stimulate invention by this reward to the inventor. It must be administered in conformity with this liberal policy, as a wise exception from the common-law rule against monopolies. So the exclusive privilege of the patentee must be protected to the full extent of his invention and grant."

And as said by this Court in *Keystone Mfg. Co. vs. Adams* 151 U. S., 139.

"But when, in a class of machines so widely used as those in question, it is made to appear that at last after repeated and futile attempts, a machine has been contrived which accomplishes the result desired, and when the Patent Office has granted a patent to the successful inventor, *the Court should not be ready to adopt a narrow or astute construction, fatal to the grant.*" (Italics ours.)

CLAIM 13

In claim 13 Mr. Layne expresses his invention in slightly different language. It calls for "the combination with"

- (1) a pump and
- (2) its actuating shaft
of
- (3) a sectional casing therefor, provided at each end
of each section with a
- (4) fixed block with
- (5) bearings for the shaft

and adds the words of description of the casing, "the casing being closed at the top and provided with a vent."

The words of this claim definitely describe the fact that the enclosing casing or conduit is made up of sections. That at the end of each of its sections this casing or conduit supports and fixes in position a block or part which provides the bearing for the shaft. In construing this claim "the casing" must be interpreted to be "a casing" having the functions of the Layne invention, i. e., enclosure, alinement, protection and lubrication. The casing is to be closed at the top, i. e., the casing or enclosing conduit so formed *that the water being pumped may not run into the top and carry sand, etc., thereinto to destroy the bearings.*

The casing must also have a "vent" or air passage at the top thereof so that the lubricant may, by *gravity*, flow down from bearing to bearing. As before stated, such a "vent" operates precisely as a "vent" or air opening, made in the top of a coal oil can by the housewife to permit the flow of oil down within the can and out a spout at the bottom thereof. The term "*air vent*" has a *definite and precise* meaning and is defined in Knight's American Mechanical Dictionary as follows:

"The opening in the top of a barrel to allow air to pass in as the liquid is drawn out."

The reason, for allowing air to pass in the top of the barrel is to equalize the pressure above and below the liquid. If air were not admitted to the barrel at the top thereof, a vacuum condition would be produced above the liquid as the level thereof lowered. As the liquid, being drawn out, would be subjected to atmospheric pressure at the outlet hole, it would not flow freely unless such atmospheric pressure at such outlet were equalized and nullified by an equal atmospheric pressure above the liquid in the barrel, hence the necessity for making a small hole or air passage or "*vent*" in the top of the barrel to subject the top of the liquid therein to atmospheric pressure.

In the Layne structure, air can pass through the upper stuffing box 50 or into pipe 52, if the cap thereon be but slightly loosened or removed. As said before, this is but a small detail requiring no explanation to a mechanic. Layne's reference to the "*air vent*" is an ample disclosure of such feature to anyone skilled in the art.

It is contended that the "*air-vent*," referred to in claim 13, is the pipe 52 *when used*, if so desired and at one's option, as a pipe through which to *force* air into the casing for cleaning out the same when the pump is idle. Of course, when so used, the pipe 52 cannot be properly called an "*air-vent*," which is an opening to permit the passage of air *to equalize pressures*.

When speaking of said pipe 52, *as used* as an "*inlet*," through which *to force* air into the casing and

thus force out any objectionable material therein through the hollow rod 44, Layne *properly and accurately* designates such pipe *merely* as an "air inlet," and that is all it is during such *cleaning operation*.

Claim 14 is the claim that covers the "*adjunct*" or *auxiliary* means provided for *cleaning out* the casing when the pump is idle. This is the subject described in lines 74-82, col. 2, page 3, of the Layne patent in suit, and misconstrued in the majority opinion of the Court of Appeals in this case, as hereinafter pointed out. In this claim 14, the hollow rod 44 *is made an element* and the pipe, through which the air is forced, is properly designated *merely* an "air inlet."

Thus we see, Layne was most accurate in his use of terms in describing these *two different features* in his *structure*—*one*, an "air-vent" performing its function during the operation of the pump; the other, an "air inlet" performing its function when the pump is idle and in connection with *a subsidiary adjunct* adapted to be employed *at one's option*.

Claim 13 cannot be construed as covering such *subsidiary cleaning means or adjunct* for the reason that it does not include one of the essential elements thereof, to-wit: the hollow rod 44 through which the material must be ejected, if said adjunct be utilized. Without such hollow rod, there would be no complete sub-combination capable of being utilized in the cleaning operation.

Furthermore, the fact Layne uses two different

terms "*air-vent*" and "*air-inlet*" shows he meant two different features. To construe these claims otherwise would be contrary to the ordinary rules governing the construction of written instruments.

Furthermore, it is apparent pipe 52 is adapted, at different times, to perform various functions. It may be used as an "*oil-inlet*," or as an "*air-vent*" or as an "*air-inlet*."

Obviously, when used as an "*air-inlet*" it is being utilized as a part of a minor adjunct—an auxiliary means or sub-combination provided to be used, at one's option and when the apparatus is idle, to clean out the casing and said sub-combination or adjunct is covered by another claim, to-wit, claim 14, where it is accurately and correctly called an "*air-inlet*."

However, even if claim 13 be construed as calling for pipe 52, as used as an "*air-inlet*" as well as an "*air-vent*," nevertheless one could not escape the charge of infringing such claim by merely not utilizing one of the functions or attributes of such element.

This proposition has been fully covered by decisions in the Ninth Circuit. Judge Cushman, in *Wilson vs. Union Tool Company*, 237 Fed. 847, has particularly ruled against any such contention. In that case defendant's device was held to infringe, although "defendant did not appropriate the perhaps relatively more important conception of Wilson" (top of page 854). Judge Cushman said "this does not excuse it,

or take from the infringement it has practiced" (page 854). And at page 855, he says:

"The forked formation of complainant's reamer body was essential to the complete collapse of the cutters; but it was not essential to the co-action in the particular in which infringement is found. The fact that, in describing, in the claims, a member of a machine which performs two functions in such a way as to disclose a feature of its fitness to perform one function, which feature is not essential to the discharge of its other function, does not warrant competitors in dropping such feature and thereby appropriate one-half of the invention and its advantage, nor prevent the Court from according the patentee such a range of equivalents as will fairly protect him in the substantial merits of his invention. If so, form becomes everything, and substance nothing."

Judge Cushman's decree was affirmed by this Court in *Union Tool Company vs. Wilson*, 249 Fed., 736. In that opinion, Judge Hunt, Judges Gilbert and Ross concurring, said:

"The fact that the appellant has not used *each attribute* of the Wilson invention cannot excuse it from being held to infringement. The *Paper Bag Case*, 210 U. S., 405; 28 Sup. Ct., 748; 52 L. Ed., 1122; *Stebler vs. Riverside Heights Association*, 205 Fed., 735; 124 C. C. A., 29; *Parker vs. Automatic Machine Co.* (D. C.), 227 Fed., 451; *Jackson Fence Co. vs. Peerless Fence Co.*, 228 Fed., 691; 143 C. C. A., 213; *Walker on Patents*, Sec. 350."

THE RANGE OF EQUIVALENTS VARIES WITH THE SCOPE
OF THE INVENTION

The above-mentioned statement is often referred to as though it were a *rule of law*. However, it must be apparent that it is not a *rule of law*, but a *law of nature*. Any broad idea can be expressed in more equivalent ways than a narrow idea. A broad inventive "*idea of means*" can be expressed in more equivalent forms than can a narrow inventive "*idea of means*." Therefore, *it is a fact*, not a rule of law, that the range of equivalents varies with the scope of an invention—the broader the invention, the greater the range of equivalents.

The larger a bucket is, the more water it will hold. The broader an invention is, the greater the range of equivalents.

Such a *fact* observation or generalization does not, however, aid a court, in any particular case, in determining the range of equivalents to be accorded an invention involved in the case. In the same way, the fact observation that: the larger a bucket is, the more water it will hold, does not aid anyone in determining the amount of water any particular bucket will hold.

The question of infringement is a question of *substantial identity*. To determine such question, the first fact to be determined is just what was the patentee's contribution to the art. What was his novel abstract "*idea of means*"? Having determined the exact metes and bounds of such contribution or "*idea of means*,"

one is then in a position to determine whether or not the defendants' device expresses such "*idea of means*." If it does express the same, but in a "*form*" differing from the "*form of expression*" disclosed in the patent, then, of course, the *elements*, employed by the defendants in expressing such "*idea of means*," are necessarily within the *range of equivalents* to be accorded the patentee's invention.

We respectfully submit, therefore, that one cannot fix the "range of equivalents" until the exact scope of an invention is determined and then the range of equivalents includes *any and all forms* in which the invention can be expressed. As said in *Detroit Copper Mining Co. vs. Mine & Smelter Co.*, 215 Fed., 103:

"When the whole *substance* of the invention may be copied in a *different form*, it is the duty of courts and juries to look through the *form* for the *substance* of the invention."

As said by this Court in *Bates vs. Coe*, 98 U. S., 31:

"In determining about similarities and differences, courts of justice are not governed merely by the names of things; but they look at the machines and their devices in the light of what they do or what office or function they perform, and how they perform it, and find that a thing is substantially the same as another, if it performs substantially the same function or office in substantially the same way to obtain substantially the same result; and that devices are substantially different when they perform different duties in a substantially different way, or produce substantially a different result."

DISCUSSION OF DECISION IN VAN NESS CASE

Admittedly, defendants' infringing structure is, like Layne's, a deep-well pump mechanism adapted to be assembled, *unit by unit*, at the mouth of the well-bore and lowered, *unit by unit*, into the well-bore and, when completely assembled and lowered, to hang *pendent* from the surface, like a plumb-bob, said mechanism consisting of, in combination,

- (1) a *pump impeller* attached to a
- (2) *sectional line or power shaft* extending to the top of the well;
- (3) a *pump casing* enclosing the pump impeller;
- (4) a *water discharge sectional casing* extending from the pump casing to the top of the well; and
- (5) a *sectional shaft enclosing casing* extending from the pump to the top of the well.

Defendants contend, however, that such shaft-enclosing casing does not perform the three functions performed by Layne's shaft-enclosing casing, to-wit:

- (a) *alinement* of shaft
- (b) *protection* of shaft bearings
- (c) *conduit* for lubricant.

We shall now discuss the Van Ness decision in respect to the three functions respectively performed by Layne's shaft-enclosing casing and by the shaft-enclosing casing in the Van Ness structure.

VAN NESS CASE, 213 FED., 804

In order that your Honors may know precisely what pump structure was held to infringe in this *Van Ness* case, we reproduce on the opposite page a drawing of the Van Ness pump. The original cut, of which this drawing is a reproduction, appears opposite page 73 of the brief filed in the Court of Appeals by the appellant, Marvin B. Van Ness. The opinion of the Court of Appeals, in the *Van Ness* case, shows this drawing was accepted as correctly disclosing the Van Ness pump.

By reference to this drawing, it will be seen the Van Ness pump embraced a structure hung pendent from the top of the well and including a *sectional shaft* enclosed in a *sectional casing* provided with *intermediate shaft bearings* and said casing being surrounded by the water-discharge casing communicating with the discharge outlet of the pump casing. The lubricant is fed to a point above the first shaft bearing and circulates or passes, *by gravity*, between such bearing and the shaft, between each successive bearing, within the shaft-enclosing casing and the shaft, and finally between the *long sleeve bearing* and shaft into the pump casing, thus lubricating all said bearings, in series.

It will be noted that the lower *thrust bearing does not bear on its seat* and, therefore, offers no *mechanical obstruction* to the passage of the lubricant down between the *long sleeve bearing* and the shaft. Con-

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versely, said *thrust* bearing offers *no mechanical obstruction* to the passage of water up between the long sleeve bearing and shaft and then out into the shaft-enclosing casing. Of course, the "long sleeve bearing," itself, offers a mechanical obstruction to the flow of water and detritus upward between it and the shaft. This "*long sleeve bearing*" plus "*the down pressure and down flow of lubricant*" prevent the water being pumped and the detritus carried thereby from passing upward between the long *sleeve* bearing and shaft and thus coming into contact with and destroying the *intermediate* bearings located within the shaft-enclosing casing.

The Court of Appeals held this Van Ness pump infringed because it embodied the *substance* of Layne's idea of means and embraced a shaft-enclosing casing performing the three functions of (a) *protection*, (b) *conduit for lubricant*, and (c) *alinement*.

(a) *Protection in Van Ness pump*: Regarding the protection afforded by the shaft-enclosing casing against the destructive action of the detritus carried by the water being pumped, the Court said:

"The defendant denies that his pump-shaft casing performs any one of the three functions attributed to that of the patent in suit. He denies that it is a closed casing in any true sense. *It seems not to be closed so far as concerns the entrance of air.* However, the proper interpretation of the words 'closed casing' is a closure *only against what is necessary to be excluded for the successful operation of the invention*, and that, in this case, as we under-

stand it, *is water and sand*, because when not excluded the first corrodes and the second wears the shaft and its bearings. It seems also true that the closure against water *is only partial*, since the *lower bearing* of defendant's apparatus is not within the enclosing casing, *though the intermediate and top bearings are*. So it seems doubtful whether the defendant's pump casing keeps the water from the shaft and bearings *when it is not in operation*, and the argument is that in the rice country, where it is principally used, it remains out of service nine months of the year. For these reasons, it is argued that the defendant's casing is not a closed one, even against water and sand. However, the record shows that protection against water and sand is afforded by defendant's casing to all *but one* of the bearings and to the shaft in the same degree as by that of the patented casing, *at least during the period of the pump's operation*, and that the protection afforded by defendant's casing is different *only in degree* from that afforded by the patented casing."

INFRINGEMENT IS NOT AVOIDED BY IMPAIRMENT OF THE FUNCTIONS OF AN ELEMENT IN DEGREE

It will be noted the Court held it *immaterial* that the Van Ness shaft-enclosing casing did not afford as *complete* protection as did the Layne casing. This finding is in accord with numerous decisions to the effect that "*Infringement is not avoided by impairment of the functions of an element of a patented device in degree . . .*" *Kawneer Mfg. Co. vs. Detroit Show Case Co.*, 240 Fed., 739. As said by Chief Justice (then Judge) Taft in the case of *King Ax Co. et*

al. vs. Hubbard, 97 Fed., 795, 803, Judges Lurton and Severens concurring:

"This is an instance, not infrequent in patent litigation, where the infringer has sought to evade the claim of a patent, the *substance* of which he is appropriating, by deliberately *impairing the function* of one element, without destroying the *substantial identity* of structure, operation, and result. *Sewall vs. Jones*, 91 U. S., 171; *Coupe vs. Weatherhead*, 16 Fed., 673; *Machine Co. vs. Binney*, 24 Fed. Cas., 653."

In *Sewall vs. Jones*, 91 U. S., 171, this Court said:

"To constitute an infringement, the thing used by the defendant must be such as substantially to embody the patentee's mode of operation, and thereby to attain the *same kind of result* as was reached by his invention. It is not necessary that the defendant should employ the plaintiff's invention to *as good advantage as he employed it*, or that the result should be the *same in degree*; but it must be the *same in kind*."

In *Manton-Ganlin Co. vs. Dairy Machinery Co.*, 238 Fed., 210, 215, it is said:

"The *impairment of the function of a part* of a patented structure by *omitting a portion* will not avoid infringement, nor will a mere change in form, when the principle of operation is preserved and appropriated."

It is to be noted, however, that it is *when the pump is in operation* that the bearings need *protection* from

the destructive action of the sand and detritus carried *by the water being pumped.*

When the pump is idle, the water in the well is in a relatively quiescent state and, therefore, the sand and detritus therein *settle* so that any water, which might get into the shaft casing during such periods of idleness, would not carry such destructive detritus. Furthermore, the sand and detritus will wear and cut out the bearings and shaft *only* when the shaft is *rotating* during the pump's operation. When the shaft is *not* rotating and the water is practically quiescent, there could be no wearing or destructive action by the detritus. Furthermore, the lubricant adhering to the shaft and bearings after cessation of operations, would sufficiently protect same from corrosion by any water that might slowly seep into the casing during non-operating periods.

It is, for the foregoing reasons, that the Court of Appeals, in the *Van Ness* case, held the Van Ness pump embodied the *substance* of Layne's *protective feature because, when operating, the Van Ness shaft-enclosing casing, in co-operation with the downflow of lubricant therein, effectually excluded the water being pumped and the detritus carried thereby.* In other words, as said, in substance, by this Court, in *Sexall vs. Jones, supra*, to constitute infringement it was not necessary for Van Ness to employ Layne's invention to *as good advantage as Layne employed it* or that the result should be the same *in degree.*

Furthermore, if Van Ness had seen fit so to do, he could have continued the feeding of the lubricant during the pump's idle periods, in which event, the down-flow of lubricant in co-operation with the shaft casing would have continued to exclude all water and detritus precisely as during operating periods. Layne's means were present for accomplishing such a result.

Continuing its discussion of the Van Ness closure, the Court of Appeals said:

"The closure in the *patented* casing is effected by stuffing boxes *as well as by the presence and downward pressure of the oil between the bearings and the shaft*, which serve to keep the water from pressing upward into the shaft casing between the bearings and the shaft. *The closure in defendant's casing is effected by the last method only*, and without the use of packing or stuffing boxes. Each casing serves to effect at least a partial closure against the water and sand. The difference is one of method and *degree* only, and for that reason it seems that the defendant's casing infringes this element of the patent, at least to some extent."

The foregoing *finding of fact* fully confirms the correctness of Mr. Layne's testimony herein (R., 606) to the effect that, in the Layne patented structure, the water and sand are excluded from the shaft-enclosing casing by

1. Mechanical means "*helped*" by the co-operation of the
2. Downward flow and pressure of the lubricant.

It will be noted, the Court of Appeals found that, in the Van Ness structure, the water and sand were excluded,

2. "By the last method only," to wit: *The downward flow and pressure of the lubricant.*

However, we believe the Court simply meant, by so finding, that the Van Ness structure did not embrace packing or stuffing-boxes, but did embrace, *as is obvious, the long-sleeve bearing*, in co-operation with which *mechanical means*, the downward pressure of the lubricant could exclude the water and sand.

As we shall hereafter demonstrate, the structure, of the defendants' herein, embraces not only the same *long-sleeve bearing* and the downward pressure of the lubricant found in the Van Ness structure, *but additional mechanical means* constituting a packing and stuffing-box and also other mechanical means for making the *long-sleeve bearing* more effective in its operation as the full equivalent of the Layne stuffing-box.

(Note: In the *Van Ness* case, the defendant produced proofs showing that the lower *thrust bearing* rested on its seat on the brass bushing *only* during the *installation* of the pump. The shaft was then raised and adjusted so such contact between this bearing and the brass bushing was eliminated. The testimony on this point is quoted on page 74 of the Van Ness Brief and reads as follows:

"A. The lower thrust bearing as shown on that drawing [reproduced opposite page 78 of this

Brief] does not operate when the pump is in operation. It is put on that pump solely for the means of acting as a stop and when the pump is ready for operation this lower thrust or stop-bearing is raised from the bushing and the thrust is placed on the ball thrust bearings at the top of the pump and being placed there by the top adjusting nut, as shown. The thrust is transmitted through the pully through this thrust bearing."

The foregoing shows this thrust bearing *in no way aided* the downward pressure of the lubricant in excluding the water and sand. That the Court accepted this proof as *correctly disclosing the operation* of the Van Ness pump, is clearly indicated by its finding that "The closure in defendant's casing is effected by the *last method* only, and without the use of packing or stuffing-boxes." The "last method" was described, by the Court, as "*the presence and downward pressure of the oil between the bearings and the shaft, which serves to keep the water from pressing upward into the shaft casing between the bearings and the shaft.*"

(b) *Lubrication in Van Ness Pump*: Regarding the lubrication employed in this pump structure, the Court of Appeals said:

"The second function of the *patented* casing is that of providing lubrication for the bearings. In *both casings*, that of defendant *as well as that of complainant*, the oil is put in the apparatus *at the top and passes through the bearings from the top through the intermediate to the lower bearing*, being retained for a time above each bearing and serving in this way not only to lubricate each bear-

ing, *but also to help close the shaft casing against the ingress of water and detritus.* The defendant's casing and that of the patent in suit perform this function to substantially the same extent, though the respective bearings as to the means for the flow of the oil through them are somewhat differently constructed."

It is obvious, said downward flow and pressure of the lubricant in Layne's patented casing could not "*help close the shaft casing against the ingress of water and detritus*" unless such lubricant was able to enter and pass down between the shaft and the lowest shaft bearing and between the shaft and stuffing in box 40, at which points the water and detritus would tend to enter the said shaft-enclosing casing. If the lubricant passed between the shaft and such bearing and stuffing, it would then enter the pump casing containing the pump impeller, precisely as Mr. Layne testified herein.

We shall hereafter demonstrate that the defendants' pump structure not only employs precisely the aforesaid so-called "circulatory" system, but it also employs the so-called "stagnant" system of lubrication, in which the heavy grease remains within the shaft-enclosing casing *for years* after being applied by the defendants herein.

It is to be noted that the shaft-enclosing casing, so far as lubrication is concerned, merely functions as *a conduit for the lubricant.* In the respective structures of Layne, Van Ness and defendants herein, the lubricant is fed into the top of the shaft casing which

merely acts or functions as a *conduit* down which the lubricant flows.

After the lubricant has passed down, in such conduit or shaft casing, through each of the bearings therein, *it has completed its lubricating function*. It is quite immaterial what then becomes of it. In such lubrication of the bearings, the shaft casing functions merely as a *conduit* and, therefore, such "*conduit function*" is completely performed by it in respect to any lubricant that has passed through all of the bearings. It is, therefore, quite *immaterial*, so far as concerns the performance of such conduit function, what becomes of the lubricant after it so passes through the casing.

Nevertheless, the main ground of defense herein is the contention that infringement is avoided if the lubricant escapes from the bottom of defendants' shaft casing after it has passed through such casing and conduit and thus completed its lubricating function.

In the first place, the lubricant passes through Layne's shaft casing and from the bottom thereof through the stuffing-box into the pump casing, just as the proofs show and just as the Court of Appeals, in the *Van Ness* case, held and just as Judge Dietrich herein found to be the fact.

In the second place, if such were not the case, nevertheless infringement would not be avoided by any such immaterial variation in respect to an immaterial feature. Layne's patent is not on a process of lubrication but covers a structure, in which one element operates as a *conduit for lubricant*. What be-

comes of the lubricant after passing through such conduit is immaterial. There is no pretense to the contrary.

The broad and *revolutionary* Layne invention does not depend, in respect to novelty, patentability, mode of operation and results accomplished, upon any such practically immaterial and minor characteristic *as the ultimate disposition* of the lubricant after it has performed its *two-fold function* of lubricating the bearings and helping to exclude the water being pumped and the detritus carried thereby.

In the *Getty vs. Layne* case, the Court of Appeals found, *as a fact*, that

"The Layne patent . . . did accomplish a *revolution* in the well-drilling industry."

Certainly this *revolutionary* invention, to use the words of Judge Gilbert in *Parker vs. Stebler*, 177 Fed., 210, "*marked a distinct step in advance, whereby a notable success was achieved.*"

It can properly be designated as a "*pioneer improvement*" which stands *at the head* of a *new class* in this art. Being of such a *generic* character, the *generic* claims in suit should be accorded a liberal construction and held to cover every *species* within the *genus*, just as Judge Hawley said in *Los Angeles Art Organ Co. vs. Aeolian Co.*, 143 Fed., 880, 884: "This (generic claim) included the numberless *species* in which the skilled mechanic or future inventor might embody their creation."

The attitude of the courts, towards such meritorious inventions, is thus expressed by Chief Justice (then Judge) Taft, speaking for the Court of Appeals for the Sixth Circuit in the case of *King Ax Co. vs. Hubbard*, *supra*:

"This Court, following the Supreme Court, has pointed out in a number of cases that, the more meritorious the patent, the more liberal will the Court be in applying the doctrine of equivalents *to cover devices adopted for the purpose of appropriating all that is good* in a patent without rendering the tribute which the patent law was intended to secure, for a temporary period, to those who by their ingenuity have made possible *real progress in the industrial arts.*"

(c) *Alinement of Bearings in Van Ness Pump*:

Regarding this feature, the Court of Appeals said:

"The third function performed by the shaft casing of the patent in suit is that of *aligning the bearings and the pump shaft* so as to keep the latter in a vertical position in the well. In the absence of intermediate support, the tendency of the shaft, if suspended only from the top, would be to swing laterally in the well, and so get out of alignment. This is corrected by taking advantage of the downward pressure of the shaft due to gravity, in connection with the intermediate bearings through which the shaft passes."

The Court found this feature present in the Van Ness pump which is, like Layne's, a structure *suspended* from the top of the ground—a *pendent* structure *not supported on the bottom of the well as was*

the Getty pump. As said by the Court in the *Getty* case:

"It is also true that the Getty pump cannot be held to infringe the means that Layne used to keep his shaft properly aligned, since that was accomplished by *suspending* the mechanism from the top of the well, while Getty's pump mechanism receives its support *by resting on the bottom of the well.*"

In such regard, the Getty pump departed from the Layne invention in respect to one of its dominating and fundamental features. The great value of the Layne invention resides, in part, in the very fact that the structure, *concretely expressed in said invention*, can be assembled, *unit by unit*, on the top of the ground and lowered, *unit by unit*, into the well, so that finally the whole structure is assembled and installed *suspended* from the top of the well like plumb-bob, all without the necessity of man entering the well.

It will be noted that the Van Ness pump structure did not embody the subsidiary features and adjuncts disclosed in the Layne patent, such as the wedges, slip-joints, cleaning means, packing-compression means, etc., referred to in defendants' brief herein. These features and *adjuncts* are covered by specific claims not involved in either the *Van Ness* case or in the instant case and were not essential to the commercial success of the Layne invention. The *essence*, the *substance* of Layne's broad idea of means, is covered by the claims in suit.

The very fact that such *subsidiary features* were not

embodied in Layne's commercial structure and have been appropriated by the various infringers of patent in suit, demonstrates that the great commercial success of the Layne apparatus must be attributed *alone* to the features covered by the *broad* *claims* sued on herein.

INFRINGEMENT

THE MAJORITY OPINION OF A CIRCUIT COURT OF APPEALS REVERSES THE FINDINGS OF FACT OF THE TRIAL COURT BOTH AS TO (A) THE CONSTRUCTION AND (B) THE MODE OF OPERATION OF THE DEFENDANTS' APPARATUS.

In his opinion, Judge Dietrich states: (R., 892, 893.)

"I do not attempt minutely to describe the defendants' structure. *Long before they entered upon its manufacture they were intimately familiar with the plaintiff's mechanism both from the patent itself and from actual installations in the field.* While in the unassembled parts there are many minor differences of construction, in the assembled structures I find no substantial distinction. Both accomplish the same result by substantially the same means, operating in substantially the same way. The defendants' structure is sectional, and is installed and removed from the well in the same manner as that of the plaintiff. There is a close correspondence between the shaft sections, shaft casing sections and water conduit sections. The fact that in the defendants' mechanism the shaft bearing is an integral part of the combination coupling for both the shaft casing and the water conduit sections, and that no part of the pendent

weight is carried by the shaft casing, while in the plaintiff's structure the bearings are built into the shaft casing alone or its coupling, is unimportant. In either case, when the members are assembled they constitute indispensable and integral parts of a single mechanism, and the two assembled mechanisms are strikingly similar in both form and function. In the Halstead patent (No. 1,228,770—June 5, 1917), under which the defendants profess to act, *open joints in the shaft casing are specified, for the purpose, it is said, of admitting small quantities of water therein*, the contention being that by using as a lubricant emulsifying oil, which will mingle with the water thus admitted, the cost of lubrication may be materially reduced. The practicality of the idea may be doubted, but it need not be discussed. *While in the earlier stages of the trial defendants vigorously resisted the plaintiff's contention that in the structure they actually installed in the field the shaft casings were made water-tight, the position was virtually abandoned before the close of the hearing; but, however that may be, the plaintiff's contention is thought to be supported by the overwhelming weight of the evidence. At the outset the defendants may have undertaken to follow the teaching of the Halstead patent, but at the time the suit was commenced they were using great care so to construct and assemble the sections and their connecting parts that when assembled a perfect union was made between the casing and coupling, to the complete exclusion of water; and as added safeguards, the joints were sealed with white lead, and for a considerable distance the space between the driving shaft and the walls of the casing was packed with hard grease."*

(It is to be noted in this connection that in the concluding day of the trial, when plaintiff's expert,

W. A. Doble, Sr., was upon the stand in rebuttal, and the facts were being brought out with respect to the defendants' contention that they were using the device of the Halstead patent, with the loose joints in the shaft-protecting casing for the purpose of admitting water and using water lubrication, defendants' counsel made an objection, and, in order to avoid the testimony of such expert witnesses, stipulated that the joints of the shaft-enclosing casing of defendants' apparatus were tight and that defendants did not use the water lubrication of the Halstead patent. We refer particularly to R., 848-49, as follows:

"MR. LYON—Q. What effect or function has such white lead in that connection?

A. White lead, in that connection, performs the function of a packing to make a tight joint.

Q. To what extent is white lead used for that purpose in the mechanical art?

A. In the mechanical art it is used very extensively. I have used it myself for over forty years.

Q. Can you produce any standard text-books upon the question to show that it is so used?

MR. TOWNSEND—There is no controversy, your Honor, that white lead will perform that function under various conditions. Perhaps it performs that function here. It apparently does in some of the pumps. It is immaterial.

THE COURT—If you admit it performs the function here, I will sustain the objection.

MR. TOWNSEND—I do not see how we could controvert the fact that that would perform the function of making a tighter joint than it would if it was not put in there. But to say it makes an absolutely tight joint from top to bottom of the well, we do not think so, our tests show

that it does not. But it makes a tighter joint than it does if you do not put it in. I will admit that. It is a mere matter of degree as to how much tighter it gets.

THE COURT—Mr. Townsend, I understood your witnesses impliedly to deny that it had that function; that they put it in for the purpose, merely, of preventing corrosion or rust of the two parts.

MR. TOWNSEND—I believe it was put in, primarily, for the purpose of preventing rust.

THE COURT—I shall permit him to testify unless you admit it does perform that function, that is, that it performs the function of sealing the joints.

MR. TOWNSEND—I see no objection to agreeing to that stipulation as an additional function in the matter of preventing corrosion.”)

In the majority opinion of the Court of Appeals, it is stated:

“The defendants in their answer deny infringement of plaintiff’s patent, and allege that the well mechanism charged by the plaintiff as an infringement of the patent in this case was manufactured in accordance with and under the protection of letters patent No. 1,228,770, issued to Stanley M. Halstead, June 5, 1917.

* * * * *

“The evidence did, however, tend to prove that some water passed through the conduit or shaft casing at the tube joints to the interior shaft.

(276 Fed. 472, 474.)

It is inconceivable why the majority of the Court of Appeals made this reference to such Halstead pat-

ent or to such erroneous statement of fact as to the mode of operation, unless such majority, to some degree and for some purpose, in their finding of non-infringement, relied thereon. It is to be noted in this connection, that the findings of fact of Judge Dietrich are approved and confirmed by Circuit Judge Gilbert in his dissenting opinion, wherein he says:

"I submit that the question of infringement in this case is not determinable upon the mechanism described in the Halstead patent. It is determinable upon the mechanism which was actually used by the appellants at the time of the institution of the suit. The Court below found, and it is so shown by the evidence, that while at the outset the appellants may have undertaken to follow the Halstead patent, they had abandoned it at the time when the suit was commenced, and were using great care so to construct their mechanism as to make a perfect union between casing and coupling with the complete exclusion of water; that the joints of their structure were sealed with white lead, and for a considerable distance the space between the driving shaft and the walls of the casing was packed with hard grease."

In this connection, the majority opinion of said Circuit Court of Appeals states:

"In *Ransome vs. Hyatt*, 69 Fed., 148, 16 C. C. A., 185, this Court held that the *issuance of a later patent was prima facie a presumption of a patentable difference between it and an earlier patent*, following the decisions of the Supreme Court in *Miller vs. Eagle Mfg. Co.*, 151 U. S., 186, 208,

14 Sup. Ct., 310, 38 L. Ed., 121; *Boyd vs. Janesville Hay Tool Co.*, 158 U. S., 260, 261, 15 Sup. Ct., 837, 39 L. Ed., 973. It is also a rule of law that infringement being denied, the burden of proof is upon the plaintiff to establish the charge. *Fuller vs. Yentzger*, 94 U. S., 299, 306, 24 L. Ed., 107; *Bates vs. Coe*, 98 U. S., 31, 49, 25 L. Ed. 68. We start, then, with a presumption in favor of the defendants' apparatus under the Halstead patent, and against the alleged infringement, and the burden of proof upon the plaintiff to establish infringement."

We submit that this proposition so advanced, is erroneous. It is based upon a fallacy. There is no presumption in law of non-infringement by reason of the fact that additional features in defendants' apparatus had been covered by a subsequent patent.

The fact that the defendants' structure, *in certain respects*, is covered by a subsequent patent, raises no presumption of non-infringement. Such subsequent patent may disclose a plaintiff's patented invention *plus* some addition thereto and, therefore, cover such invention *plus* the addition.

This has been so aptly expressed by the Circuit Court of Appeals for the Sixth Circuit, in *Herman vs. Youngstown Car Mfg. Co.*, 191 Fed., 579, at page 584, that a quotation therefrom places the matter entirely at rest. Said Court says:

"Defendant's device is manufactured under patent No. 765,406, issued July 19, 1904, to J. H. Wagenhorst, and the Court below gave to this fact some force in reaching his conclusion that the device did not infringe. We think that the granting

of the latter patent and defendant's conformity thereto are not of importance in this case on the infringement issue. There are expressions in some of the reported cases implying that by the later patent the government has granted a right to make and use the article so patented, and that such grant is inconsistent with any construction of the earlier patent which would forbid the manufacture of the later structure. *Such implication rests on a fundamental error.* A patent is not the grant of a right to make or use or sell. It does not, directly or indirectly, imply any such right. It grants only the right to exclude others. The supposition that a right to make is created by the patent grant is obviously inconsistent with the established distinctions between generic and specific patents, and with the well-known fact that a very considerable portion of the patents granted are in a field covered by a former relatively generic or basic patent, are tributary to such earlier patent, and cannot be practiced unless by license thereunder.

"Another reason sometimes advanced for supposing that the structure of the second does not infringe the claim of the first patent is that the Patent Office has declared that a patentable difference exists. The premise is sound, but not the conclusion. *In examining the second application, the Patent Office has no concern with the scope of the claim of the first, and does not and must not pay any attention thereto. It is concerned only with the early disclosure by the specification and drawings. Patentable difference does not of itself tend to negative infringement. It may just as well be based upon infringement, plus improvement; and improvement may lie in addition, simplification, or variance.*"

Referring further to the defendants' apparatus, in his opinion Judge Dietrich states:

"By the defendants much importance is attached to a feature of their lowermost shaft bearing—the one corresponding to the bearing in the plaintiff's mechanism equipped with a stuffing-box. In the lower portion of this bearing an annular groove is cut in the babbitt, leading from which small vents or slots are provided extending through the hub to the outside. For this device it is claimed the lubricant in the casing will work downward until it reaches the groove, and the water on the outside will have a tendency to traverse the bearing in an upward direction until the groove is encountered, and there both the water and the lubricant, following the lines of least resistance, will discharge into the well through the ducts. Upon this theory it must be apparent that so much of the bearing as is below the groove will receive no lubricant at all, and being open to the sand carried in the water, will in time cut out and cease to function as a bearing. But if it be assumed that the contrivance is possessed of both novelty and utility and is patentable as an improvement, it still remains true that in utilizing it the defendants also appropriate the basic idea of the plaintiff's invention. It is not a case where the plaintiff's mechanism is a failure and the defendants have, by a slight invention or the invention of a small element, turned it into a success. Admittedly the plaintiff's mechanism is a success, and hence the most that could be said for the defendants' device is that it is an improvement.

"It is also earnestly insisted by defendants that the two systems are differentiated by the fact that their lubricating system is circulatory, while that of the plaintiff is static. In one or two of the decisions cited *supra* more importance is attached

to this consideration than under the evidence here I have been able to accord to it. *Under the facts disclosed, the distinction is more apparent than real. In both cases the oil is fed in at the top in substantially the same manner, and under the force of gravity traverses the entire length of the shaft casing, lubricating all of the bearings in its course. In the actual operation of the plaintiff's mechanism there is necessarily some escape of thin oil through the bottom bearing; for, as already explained, a perfect closure at this point cannot be maintained. Possibly a larger quantity will escape at the bottom of defendants' structure; but even there, it is to be borne in mind, the lubricant must traverse a bearing of considerable length before it reaches the groove, and to some extent its down-flow is resisted by the upward pressure of the water, which is only reduced and not wholly eliminated by the means described. Indeed, it is very probable that in both mechanisms a comparatively static condition is, under ordinary conditions maintained at the lower end of the casing, due to the counter-action or counter-resistance of the columns of oil and water, one against the other.* In the plaintiff's mechanism a contrivance is provided for drawing or forcing out of the casing the residuum of spent or impure lubricants; but it cannot be said that the groove and vents in defendants' structure perform such a function. If, as I have been constrained to find, in the defendants' actual installations, the shaft casing is made impervious to water and it is packed for a considerable distance above and below each bearing with a hard, immobile grease, the only possible function of which can be to prevent the ingress of water, to impede the progress of the lubricating oil, and itself to serve as a lubricant, it must be held that the term 'circulatory lubricating system' is a misnomer, and that the difference in that

respect between the two systems is colorable only. But, were the contrary view to be taken, it would still remain true that the plaintiff's lubricating system is practical and efficient, and is a part of its combination invention, the fruits of which another may not rightfully appropriate by substituting for a single and successful feature other means for accomplishing the same result."

These findings of fact, as we have heretofore shown, are the judgment of the trial Court upon the oral testimony of the witnesses adduced before it. It cannot be claimed that there is no evidence supporting such findings. *The very utmost that defendants could contend is that there is a conflict of evidence.* Under such circumstances, however, the findings of fact of the trial Court are unassailable. *Adamson vs. Gilliland*, 242 U. S., 350, 353.

The trial Court's findings of fact, however, have also the support of the Presiding Circuit Judge, as clearly set forth in his dissenting opinion in the Circuit Court of Appeals, as follows:

"In both the appellee's and appellants' mechanism the oil is introduced at the top in substantially the same manner, and by gravity it traverses the entire length of the shaft, thereby lubricating all the bearings. In both there is some escape of oil through the lowest bearing. *The contention that the two systems are differentiated in that the appellee's lubricating system is static, while that of the appellants' is circulatory, is not sustained by the proofs.* In the appellants' mechanism, the shaft casing being made impervious to water and packed with hard cup grease a distance above and below each bearing, the ingress of water

is prevented, and the movement of the lubricating oil is impeded, so that there is no substantial difference in the operation of the two lubricating systems. Both use a closed casing surrounding the pump shaft from the pump to the top of the well, the casing being sufficiently closed to allow the feeding of a lubricating fluid down through the same to the various bearing parts for the shaft therein. Both accomplish the same result by substantially the same means, operated in substantially the same way. The fact that the appellants' static lubricants are supplemented by the use of an emulsifying oil is unimportant. The fact that in the appellants' mechanism more oil escapes from the lowest bearing than in the appellee's is also unimportant. *The ultimate disposition of the lubricant after its office is fulfilled is immaterial.* These differences do not enable the appellants to appropriate the substance of the appellee's invention."

We submit that the decision of the majority of the Circuit Court of Appeals is thus reversing the findings of fact of Judge Dietrich as to (a) the construction, and (b) the mode of operation, of defendants' apparatus, is unwarranted in law, erroneous, contrary to the evidence, and led such majority to an erroneous conclusion. This error permeates the entire decision, reflected in the majority opinion, of the Circuit Court of Appeals.

B. GENERAL DESCRIPTION OF DEFENDANTS' INFRINGING APPARATUS

For the convenience of the Court, we reproduce on the opposite page Figure 1 of the Halstead patent, under which defendants originally contended they manufactured the apparatus charged to infringe. As pointed out by Judge Dietrich, defendants departed from the teachings of this patent in respect to the *loose joints* in said patent provided between *shaft-enclosing casing sections*. In defendants' actual installations, found to be infringements, the joints between the shaft-enclosing casing sections 25 and the couplings 23, are made *water-tight*. We have shown that such fact was stipulated and conceded by plaintiff's counsel near the end of the trial. We have adverted to the fact that Judge Dietrich states such fact is "*supported by the overwhelming weight of the evidence*" (R., 893).

In a general way, however, and otherwise than as to the provision of loose and leaky joints between the ends of the shaft-enclosing casing and the coupling hubs 23, the Halstead patent drawing Figure 1 may be used as an illustration by which defendants' infringing apparatus may be readily understood.

In said Figure 1, the pump 5 is attached to the *sectional* shaft 7 which extends to the top of the well through the shaft-enclosing sectional casing 8, 8a, 23, in which are supported the shaft bearings 22; the shaft casing is surrounded by the water discharge *sectional* casing 9, 9a, 17a, which extends from the

S. M. HALSTEAD.
PUMP MECHANISM.
APPLICATION FILED DEC. 20, 1915.

Patented June 5, 1917.
2 SHEETS—SHEET 1.

1,228,770.

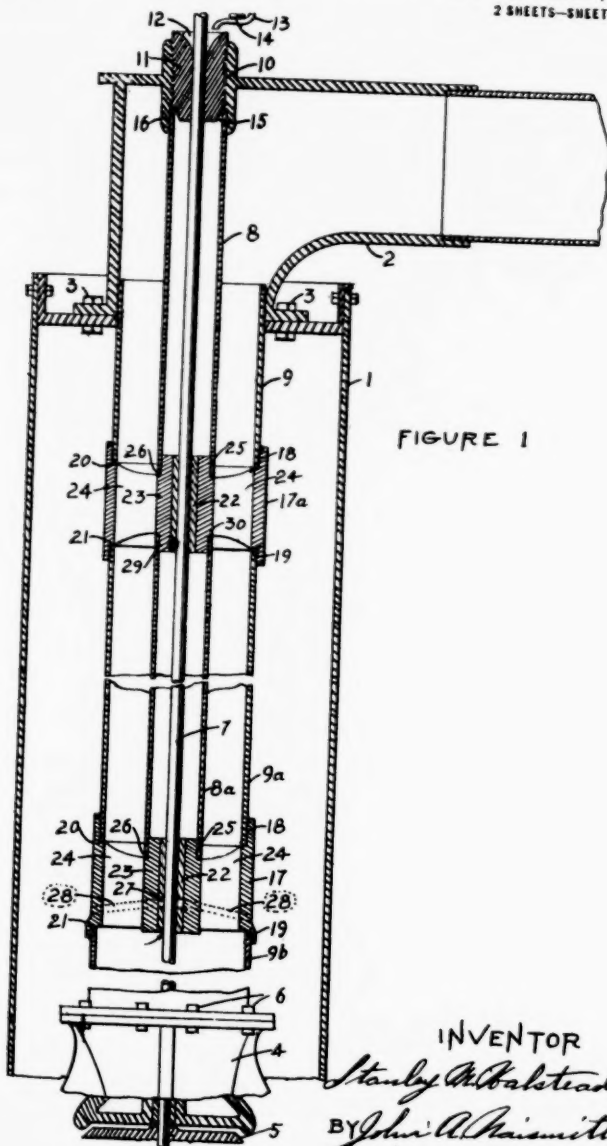
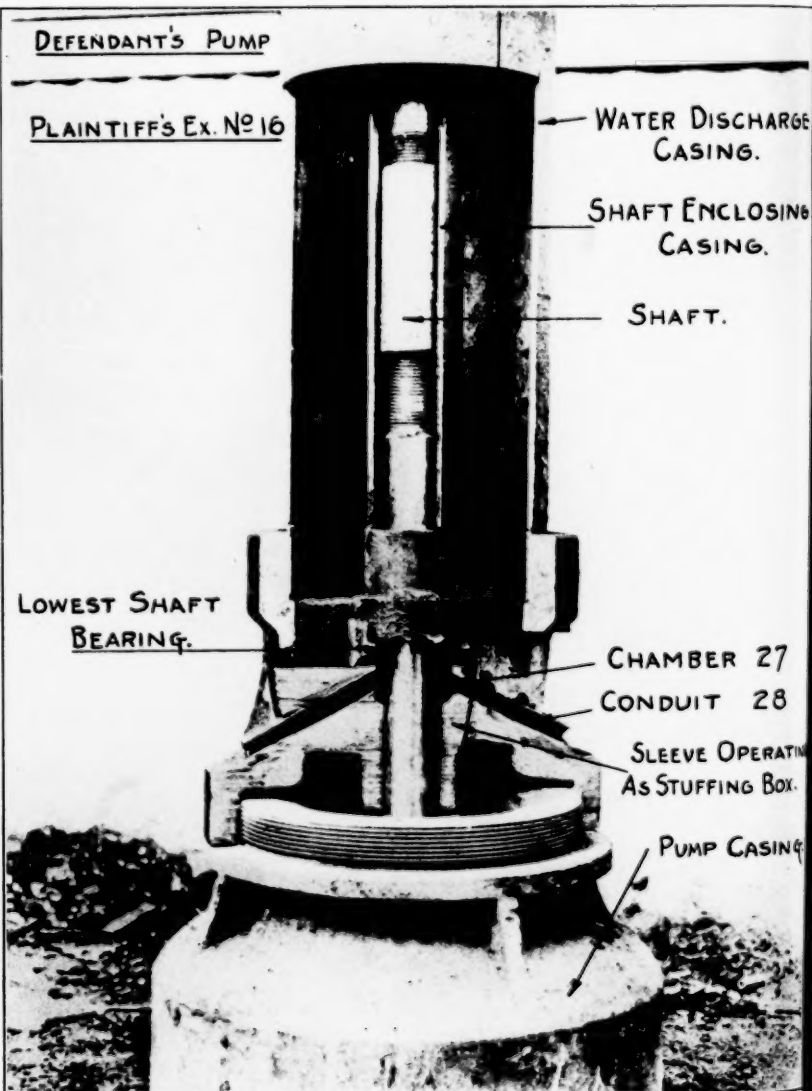


FIGURE 1

INVENTOR
Stanley M. Halstead
BY *John A. Haismith*
HIS ATTORNEY

DEFENDANT'S PUMP

PLAINTIFF'S Ex. No 16



pump casing to the top of the well; the shaft casing and water-discharge casings are *bound together* into an *integral structure* by the connecting pieces or webs 24 and the whole integral structure is supported at the top of the well and hangs *pendent* within the well casing 1.

Lubricant, with the exception of the hard grease packed in the shaft casing by defendants at the time of installing the structure, is fed into the top of the shaft-enclosing casing at 12 and passes or circulates down the casing through each intermediate bearing and through the lowest bearing into the chamber 27 from which it overflows and passes through the conduits 28 into the well. In defendants' pump (Anderson pump, Plaintiff's Exhibit 4), the shaft casing is provided with a stuffing-box at the top and through this air can enter the casing. This air-vent permits the gravity downflow of lubricant within the casing, as above described.

On the opposite page is reproduced "Plaintiff's Exhibit 16," a photograph of a portion of the pump structure sold by defendants to a Mr. Anderson. The pump structure itself is in evidence as "Plaintiff's Exhibit 4" (R., 571). As is apparent, portions of the water-discharge and shaft casings were cut out for the purpose of disclosing the interior construction of this pump structure. The data, appearing on the reproduction, was put there for the purpose of this Brief and does not appear on the exhibit photograph.

This Exhibit 16 discloses the *sectional* shaft passing

through the shaft-enclosing *sectional* casing which is surrounded by the water discharge *sectional* casing. The lowest shaft bearing, within the shaft casing, is shown and just below the same appears the annular chamber 27 from which extend the two conduits 28. In the Halstead patent, the shaft bearings are indicated as being provided with a babbitted portion 22. In defendants' pump structure, the lowest shaft bearing is a *long brass sleeve*, corresponding otherwise with the lowest shaft bearing as illustrated in the patent.

In Exhibit 16, this long brass sleeve is shown. The portion thereof, *above chamber 27*, operates as a "*bearing*" for the shaft. The portion of said sleeve, *below said chamber*, operates as a "*stuffing box*" to prevent the water being pumped and the detritus therein from passing from the pump up along the shaft into the shaft casing through the lowest bearing therein. In performing this function, it is aided by the conduits 28 which would tend to by-pass into the well any small amount of water and detritus which might force their way through the sleeve below such conduits.

The entrance of water and detritus into the shaft casing is, therefore, prevented by the long sleeve bearing at the bottom of the casing in co-operation with the pressure and downflow of the lubricant through such bearing and aided by the long sleeve operating as a stuffing-box to obstruct the upflow of the water and detritus from the pump.

As stated by Judges Dietrich and Gilbert, defend-

ants pack a large amount of hard grease within the shaft-enclosing casing and this remains in the casing for years and also assists in preventing the ingress of water and detritus into the casing.

During the normal operation of the pump, the level of the water in the well is below the conduits 28, so the only water, tending to enter the casing, would be the water being pumped; this would tend to enter same only through the lowest bearing within the casing by being forced up along the shaft from the pump. As stated before, the shaft casing, at all the joints therein, is water-tight so no water can enter same from the water-discharge casing.

In order to have definite and concise proof of the actual construction and mode of operation of the pumping apparatus manufactured and installed by defendants, plaintiff purchased from W. C. Anderson one of the pumping apparatus made and installed by defendants upon Mr. Anderson's ranch near Stockton, California. This pumping apparatus is in evidence, as Plaintiff's Exhibit 4. Exhibit 16, reproduced herein, is a photograph of a portion of such Exhibit 4 apparatus. Using said Exhibit 16 as a ready reference means for placing before your Honors the construction and interrelation of parts of Plaintiff's Exhibit 4, Defendants' Pumping Apparatus, and referring to the latter exhibit: if your Honors will refer to that section of the line or power transmitting shaft, illustrated in Exhibit 16, and extending from within the shaft-enclosing casing, through the lowest shaft bearing,

through the chamber 27 and through the sleeve operating as a stuffing-box, you will find in Exhibit 4 that that portion of this shaft which so extended through the bearing and within the casing, is *bright and smooth*, showing that it has not been subjected to wear or erosion by sand or detritus carried by the water stalled by them corresponds to Plaintiff's Exhibit 4, Anderson pump, is the pump offered in evidence by plaintiff as the exemplar of defendants' pumping apparatus. It was purchased for the purpose of an exhibit in this case. It is the only actual commercial pumping apparatus of defendants that has been introduced. The oral testimony shows that all of defendants' commercial pumping apparatus made and installed by them, corresponds to Plaintiff's Exhibit 4, except when defendants first started in their competitive business, when they attempted to use the apparatus as disclosed in the Halstead patent. The apparatus of the Halstead patent, with its water lubrication and the inlets of the water at the joints of the shaft-enclosing casing, was not a success, and was abandoned by defendants. However, that portion of this shaft section, which extended through the sleeve below chamber 27, was corroded, worn and pitted, clearly indicating the destructive action of the water and detritus which were forced into such sleeve from the pump. There could be no better proof of the efficient operation of such sleeve as a stuffing-box to effectually obstruct the passage of water and detritus

into the shaft casing through the lowest bearing therein. That no water and detritus had entered the shaft casing through such lowest bearing, was also proved by the condition of that portion of the shaft operating within such bearing and casing.

However, as the proofs show, one of these pumps will become inoperative within a few hours if the shaft and bearings are not effectively protected from the detritus in the water being pumped. Therefore, the successful operation of defendant's pumps is, by itself a demonstration that *the shaft-enclosing casing therein does afford such protection*, just as in the Layne apparatus.

Said shaft casing obviously *functions as a conduit* for the lubricant, which is fed into the top thereof and passes down through each bearing therein, thus lubricating all the bearings, in series.

Said shaft casing is also an *integral part* of the whole structure, which is supported at the top of the well and hangs therein pendent, like a plumb-bob. Being an *integral part* of such *pendent* structure, the casing itself is held *in alinement* and thus holds *in alinement* the shaft bearings supported therein, and thereby holds the shaft *in alinement*.

In said structure, the shaft, the shaft casing and the water discharge casing are made up of sections so that such structure may be assembled, *unit by unit*, at the mouth of the well-bore and, *unit by unit*, be

lowered into the well and therein hang pendent, like a plumb-bob. As said by Judge Dietrich:

"I do not attempt minutely to describe the defendants' structure. Long before they entered upon its manufacture they were intimately acquainted with the plaintiff's mechanism both from the patent itself and from actual installations in the field. While in the unassembled parts there are many minor differences of construction, in the assembled structures, I find no substantial distinction. Both accomplish the same result by substantially the same means, operating in substantially the same way. The defendants' structure is sectional, and is installed and removed from the well in the same manner as that of plaintiff. There is a close correspondence between the shaft sections, shaft casing sections and water conduit sections" (R., 892).

In other words, defendants' structure embodies the whole *substance* of Layne's generic invention covered by the three *generic* claims in suit.

On the opposite page is reproduced "Plaintiff's Exhibit 15," disclosing another view of defendants' structure. Mr. Layne also appears in the photograph.

C. DETAILED CONSIDERATION OF THE PROOFS IN RESPECT TO THE CONSTRUCTION AND MODE OF OPERATION OF DEFENDANTS' APPARATUS.

During the early stages of the trial in the lower Court, defendants' defense of *non-infringement* was principally based on the contention that, in defendants' structure, the shaft-enclosing casing or tubing

DEFENDANT'S PUMP.

PLAINTIFF'S EX. Nº 15.



Modern Well, San Jose, Cal.
Taken Oct. 2, 1914. Photo by S. H. ...
City of San Jose, Cal.



was *not* water-tight at the respective joints between the casing sections 8 and the tapered hubs 25 on the coupling-pieces 23, and, therefore, the casing did not protect the shaft bearings from the destructive action of the water being pumped and the detritus carried thereby.

The proofs so conclusively demonstrated such contention to be contrary to the facts, that defendants' counsel abandoned such contention. The proofs disclosed that each of said joints was *water-tight* and *sealed* by white lead. This was admitted by defendants' counsel.

"THE COURT—I shall permit him to testify unless you admit it (white lead) does perform that function—that is, that it performs the function of *sealing* the joints.

MR. TOWNSEND—I see no objection to agreeing to that stipulation as an additional function to the matter of preventing corrosion" (R., 849).

As said by Judge Dietrich in his opinion herein:

"While in the earlier stages of the trial defendants vigorously resisted the plaintiff's contention that in the structure they actually installed in the field the shaft casings were made water-tight, *the position was virtually abandoned* before the close of the hearing; but however that may be, the *plaintiff's contention* is thought to be supported by the *overwhelming weight* of the evidence. At the outset the defendants may have undertaken to follow the teaching of the Halstead patent, but at the time suit was commenced they were using great

care so to construct and assemble the sections and their connecting parts that when assembled *a perfect union was made between the casing and coupling, to the complete exclusion of water*; and as added safeguards, *the joints were sealed with white lead*, and for a considerable distance the space between the driving shaft and the walls of the casing was packed with *hard grease*" (R., 893).

In view of this "*finding of fact*" by the lower Court, little need be said on this question of defendants' shaft-enclosing casing affording complete and effective *protection* to the shaft and shaft bearings from the water being pumped and the detritus carried thereby. As, however, the majority opinion of the Circuit Court of Appeals has made much of this issue, abandoned by defendants in the lower Court in the face of such "*overwhelming*" proofs inconsistent therewith, let us consider briefly the proofs.

Referring again to Figure 1 of the Halstead patent, it will be noted that the end of each hub or coupling member 23 is shown reduced in diameter or, as said in the Halstead patent, provided with an annular rabbet 25, thus forming a seat 26. This annular rabbet or recessed portion of the hub is illustrated as *cylindrical* in form having *parallel* faces. The said recessed portion of the hub or casing-coupling receives the end of a section of the shaft-enclosing casing 8, and which end of the casing section slips over the hub and seats on the seat 26.

The evidence shows that, at first, defendants' used

hubs having *no taper*, such as disclosed in the Halstead patent. A tapered hub was then employed, the taper commencing about three-quarters of an inch from the seat. The hubs now used are tapered from the seat to the end of the hub. "Defendants' Exhibit C" was offered in evidence by defendants as an exemplar of their hub construction. Defendants' engineer, Conant, tested Exhibit C by using a gauge, corresponding to the interior diameter of the reamed out portion of the end of each tube section, and found same could be moved by hand without pressure only to a point *nine-sixteenths* of an inch from the hub-seat. To seat such tube section, it is obvious a great force must be applied to the tube *in order to expand its end sufficiently to pass over the enlarged portion of the hub*. Mr. Doble's testimony shows that, at the Selby ranch installation of defendants, the tube, in being forced on to the hub, was tapered, flared or made bell-shape at its end for a distance of seven-eighths of an inch from the tube end. He found the interior of the tube actually *polished* or *burnished* where it had been passed over the hub-taper and that there was a *surface* contact between the hub and tube for a distance of seven-eighths of an inch. Mr. Doble also found the white lead, used to seal the joint.

Regarding the character of joint formed by so expanding a shaft-casing section over such a tapered hub, the witness, W. A. Doble, Sr., testified:

"MR. LYON—With regard to the bell coupling joint that is made by the tapered hub and

the end of the tube, what have you to say as to that insuring a tight closure?

MR. TOWNSEND—They are referring to a flared end of a coupling that results from being pushed down onto the hub. We have told you how they are made, and I think there again that we are willing to stipulate that the more bearing surface you have between two parts, under certain conditions, you have a tighter joint.

MR. LYON—We want to prove by the witness that the pressure of this tube in the manner that has been testified to by himself and his son, by means of the screwing of the couplings together and the pressing of the tube onto this tapered hub, is one of the best known, tightest joints that are used in mechanics; that is the purpose of it; and we are following up the testimony of Wm. A. Doble, Jr., and the stipulated testimony of this witness to show that it is commonly used, in fact is used where the greatest pressures are to be expected; and I expect to show by this witness that if it is desired to take care of gasoline and other very light products, as well as very dry steam under high pressure, such bell-joints, as they are called, are used, and that they are known to give the tightest kind of a joint.

THE COURT—Unless there is an admission on the part of the defendant, I shall permit you to go into it.

A. I have very carefully observed the joints of these pumps that were withdrawn, and the tapered structure or construction of that hub, with a tube parallel and forced over the tapered hub will make the most perfect joint, using 'perfect' in a relative sense, that is known in mechanics. And in regular mechanics, on a diameter of approximately three inches, from two to three inches, to secure force-fits, which are put together under hydraulic stress, an expansion of from $3/1000$ to

6/1000ths of an inch is allowed; and from the measurements on these hubs, I find that the tube is expanded to approximately 24/1000ths or 26/1000ths of an inch, and that forces the tube to conform to the tapered structure of the hub, and makes the most perfect closure against leakage that can be produced mechanically; and, due to that forcing action, the inner surface of the tube is burnished and brought down to a perfect surface, as shown by the tube removed; and throughout all the high-pressure work which I have done, we have used, for the highest pressure work, a tapered joint; it is the common practice of the American Society of Auto-Motive Engineers for all joints, as is shown clearly in the standard forms of the Society of Auto-Motive Engineers; and, furthermore, I have used it for steam pressures as high as 1500 pounds per square inch, with super-heated steam having a temperature of from 800 to 900, or 1000 degrees, so that the steam was a red-hot gas; but it is the only form of joint which we could develop that would make an absolutely tight joint under those circumstances. The amount of expansion which is allowed there in forcing that tube over the tapered hub, and in combination with the white lead, makes a perfect mechanical closure."

In view of the proofs, and the stipulation and admission of defendants' counsel, *there can be no doubt as to the defendants' shaft-enclosing casing being water-tight at all the joints between hub and tube sections, thereby affording complete protection to the shaft bearings from the detritus in the water being pumped.*

In said Figure 1 of the Halstead patent, 22 indicates the babbitted portion of the lowest hub 23. In de-

defendants' structure, a *long brass-sleeve bearing* is used in the place of such babbitted portion of the hub immediately above the pump.

In said Figure 1, the shaft is not shown as made up of sections, but in defendants' commercial structure a jointed shaft is used.

In view of the foregoing, it will be apparent that defendants' device, like the Van Ness and Layne, embraces a structure hung *pendent* from the top of the well and including a *sectional* shaft enclosed in a *sectional* shaft-enclosing casing provided with *intermediate* shaft bearings and said casing being surrounded by the water-discharge casing communicating with the discharge outlet of the pump casing. Furthermore, the pump, in each of said structures, can be suspended at any point in the well by reason of the structure being made up of joined units or sections and thus permitting the total length of the structure being varied by the addition or subtraction of such units.

(a) *Protection in Western Well Works Pump:*

Admittedly, the defendants' shaft-enclosing casing is water-tight at the respective joints between hub and tube sections. At those points, it is obviously a closure protecting the shaft bearings from the destructive action of the detritus carried by the water being pumped.

The proofs also show that the water being pumped and the detritus carried thereby are prevented from entering the bottom of the said casing.

As in the Layne and Van Ness structures, the water

and sand are prevented from entering the defendants' casing at that point by

1. Mechanical means, "helped" by the co-operation of the
2. Downward flow and pressure of the lubricant.

Before discussing the *mechanical* closure means, found in defendants' structure, we shall refer to the system of lubrication employed therein in respect to same *co-operating with the mechanical means in excluding the water and sand*.

According to defendants' engineer, Conant, lubricant is applied to defendants' structure, when being installed, as follows: Graphite grease is placed around the top of the bearing; on top of this, cup grease is placed and, when the tube is in place, oil is poured therein. On this point, the witness Folsom said regarding the application of the heavy grease:

"A. We usually only packed the grease around the shaft before we slipped the tube down; we used generally about thirty inches on a tube, all we could make stick on, adhere to the shaft, and then we slipped the tube over.

* * * * *

THE COURT—What length of shaft?

A. I should say about 30 inches.

Q. At the top or bottom?

A. At the bottom of each section of the shaft.

Q. You mean 30 inches of each section?

A. Thirty inches of each section" (R., 629).

Defendants' witness Bradford also described the application of the graphite grease, the heavy No. 5 standard cup grease and then the oil (R., 711).

So-called "Stagnant Lubrication": The proofs show that, years after the installation of one of defendants' structures, the *original* heavy grease, in large quantities, still remains within the shaft-enclosing casing. Certainly such system of lubrication can be aptly termed a "*stagnant*" one—if it be deemed material, at all, to find defendants' using in their apparatus, a "*stagnant*" method of lubrication.

Regarding defendants' *stagnant* lubrication, the defendants' engineer, Conant, testified:

"MR. WHITE—Q. Did you ever see a pump, after it was in operation for a couple of years, disassembled?

A. Yes.

Q. Did you ever notice at that time that this grease that was put in there *originally* still covered the tubes in large quantities, in each one of these tubular sections?

A. I have seen grease on the shaft, and I have seen grease in the tube.

Q. After two or three years' use of the pump?

A. Yes" (R., 697).

Plaintiff's witness Hall also testified regarding defendants' "*stagnant*" method of lubrication. In respect to the Anderson pump, forming the basis, in the proofs, of plaintiff's charge of infringement, Hall said:

"MR. LYON—Q. Now, on these pieces of shafting up here there seems to be something sticking. What is that?

A. It was heavy cup grease.

Q. And that was in this pump when you pulled it?

A. It was" (R., 633).

"Plaintiff's Exhibit 13" is a photograph of the shaft sections removed from the Anderson pump and discloses the large quantities of *cup grease* on the sections (R., 633).

In fact, the proofs of defendants' use of such a "*stagnant*" system of lubrication were so conclusive that defendants' counsel admitted the same. He said:

"MR. TOWNSEND—There is no doubting the evidence that has been given, or of the fact that some of that heavy grease is splashed around there, and some of it is going to stay in the tube and some of it on the shaft" (R., 793).

After *admitting the use of such "stagnant system"* of lubrication, counsel now base their non-infringement defense on the contention that such a "*stagnant system*" is not employed in defendants' apparatus!

The position of defendants' counsel on this point is the same as their anomalous position in regard to the joints between hub and tube sections.

After stipulating and admitting, at the trial, that said joints, in defendants' structure, were *tight* and *sealed* by the white lead, we find counsel devoting pages of their Brief to the contention that said joints are not *tight* and *sealed*!

We do not lose sight of the fact that, in connection with the operation of one of defendants' apparatus, the user thereof applies at the top of the casing, *drop by drop*, the so-called "*emulsifying*" oil. Of course, the fact that the "*stagnant lubricants* are supplemented by

the *addition* of the emulsifying oil is immaterial. The fact still remains that the "*stagnant lubrication*" is used by the defendants in their structures.

The so-called "*emulsifying*" oil is in fact nothing more or less than the Standard Oil Company's standard thread-cutting compound (R., 720).

As heretofore stated, it is our opinion that it is quite immaterial whether or not a "*stagnant*" method of lubrication is used. The Layne invention does not reside in any such immaterial feature.

However, if it be material, it is obvious and is admitted by defendants' counsel that such a use of "*stagnant*" lubricants is employed in defendants' apparatus.

Having described defendants' method of lubrication, we shall now show the manner in which defendants' shaft bearings are protected by *mechanical* means plus the *downward pressure of the lubricants*.

Defendants, as did Van Ness, employ a *long sleeve bearing* for the shaft. This is made of brass and corresponds to the lowest part marked 22 in said Figure 1 of the Halstead patent. The only point at which water and detritus could enter the shaft-enclosing casing would be between this long sleeve and the shaft. The proofs, and the condition of the shaft and bearings in the Anderson pump, show water and sand do not pass this sleeve bearing and enter the casing.

It is to be first noted that this long sleeve bearing is, in fact, divided into two parts; the *upper* part being above the annular chamber or channel 27, which com-

municates with the conduits 28 leading into the *well outside* the water-discharge casing; and the other or lower part of the bearing being below such chamber and conduits.

As a matter of fact, such *lower* part of the sleeve bearing cannot properly be designated as a *bearing*. It cannot be lubricated and is designed to protect the upper part of the bearing from the destructive action of the sand. It *obstructs* the upward flow of water and sand from the pump and reduces the same to a minimum. Therefore, when the water and sand, which are forced upwards between this lower portion of the sleeve and the shaft, reach the chamber 27, they will then flow along the line of least resistance, to-wit: through the conduits, *out into the well*, instead of upwards between the upper portion of the sleeve bearing and the shaft.

The upward *pressure* of the water being relieved and reduced by the water entering chamber 27 and there finding an outlet into the *well*, it is obvious that the upper part of the sleeve bearing can much more effectively, if not entirely, prevent the entrance of any water and sand between it and the shaft, and thus into the shaft-enclosing casing.

However, the upper portion of the sleeve bearing is assisted in excluding the water and sand *by the downward pressure of the heavy lubricants and oil within the casing*, so that no water and sand enter the casing or pass between the upper portion of the sleeve bear-

ing and the shaft. The condition of the Anderson pump shaft and bearings demonstrate the correctness of the foregoing.

As stated by Mr. Doble, Sr., and as is obvious from an inspection of the Anderson pump structure, the shaft therein, beginning at a point thereon where the shaft enters the *upper* part of the sleeve bearing, is *bright* and *smooth*, thus indicating it had not been subjected to the corroding action of water or the brading action of sand, and had been kept lubricated by the grease.

At that portion of the shaft where it passes through chamber 27 and the lower part of the brass sleeve, the same has been corroded and abraded by the water and sand.

The use of said *lower portion* of the brass sleeve as a mechanical or stuffing-box device to protect the upper and only portion of the brass sleeve, used as a *bearing*, is accurately described in the Halstead patent, commencing at line 53, page 2, where it is said:

"It will be observed that channel 27 is placed a short distance above the lower end of bearing 17. This is done so that the lubricating emulsion will traverse the greater portion of the bearing before draining away."

Defendant and patentee, Halstead, then goes on to describe his *mechanical* means, or *stuffing-box* arrangement, for protecting said bearing. He says:

"That portion of the bearing below channel 27

will not be lubricated because the upward pressure of the water being raised will tend to force a *small* amount of water in the direction of the arrow upward through the bearing until the channel 27 is reached, where it will be drained away through auxiliary conduits 28. There being no provision for filtering the water at this point, the bearing *below* channel 27 will of course be worn by attrition, *but the major portion of the bearing will remain true and properly perform its function.*"

However, defendants do not content themselves with alone using such *mechanical* means to prevent water and sand entering the shaft-enclosing casing. They use, in addition thereto, further *mechanical* means, which also operate just as a stuffing-box operates.

Each intermediate bearing is provided with a helical groove. The heavy grease above the bearing passes, by gravity, into the groove and is moved therethrough by reason of the *smooth* surface of the rotating shaft contacting with the outer surface of the grease resting in the groove. It is to be noted the grease is moved solely by the friction between the *smooth* surface of the shaft and the exposed surface of the grease. Obviously, heavy grease would be so moved only at a very slow rate.

Professor Lesley, defendants' witness, said the *pressure*, at which the oil would be moved, increased as the *viscosity increased* (R., 881). *He failed to make any measurements of the rapidity of flow* (R., 882).

The most significant things about the Professor's testimony are the experiments and tests he did *not*

make and the questions which were *not* asked him by defendants' counsel. We shall refer hereafter more at length to this phase of his testimony.

The point we now make is that the heavy greases would be moved downward with *pressure* by reason of such helical grooves. The only possible result of such action is the packing of the heavy grease in the bottom of defendants' shaft-enclosing casing and thereby forming a most effective stuffing-box or mechanical means for preventing the ingress of water and sand between the sleeve bearing and shaft.

It is thus seen that defendants' structure embraces the following *mechanical* means for excluding the water and sand from the bottom of the shaft-enclosing casing:

a. Long brass sleeve bearing. (Note: This corresponds to the *only* mechanical means used in Van Ness pump for preventing entrance of water and sand.)

b. Lower portion of brass sleeve *not* used as a *bearing* but as an *obstruction* to passage of water and sand. (Note: Mr. Layne says this acts merely as a stuffing-box) (R., 604).

c. Helical grooves operating to pack heavy grease in bottom of shaft-enclosing casing, thus constituting same a stuffing-box. The downward flow and pressure of the emulsifying oil also co-operates with these mechanical means in excluding the water and sand.

(b) *Lubrication in Western Well Works Pump:*

We have heretofore discussed the so-called "*stagnant*" system of lubrication employed in defendants' structure. The heavy "*stagnant*" lubricants, which remain in the structure for years, are supplemented by the drop by drop addition of the lighter so-called emulsifying oil. By the use of such lubricants the bearings are lubricated *in series* by the downward flow of the lubricants. The same "*series*" lubrication of the bearings is employed in the Layne patented structure.

As stated before, the ultimate disposition of the lubricant is immaterial.

The only feature of the Layne invention that is material, in respect to lubrication, is the use of the shaft-enclosing casing *as a means or conduit* for conveying the lubricant from bearing to bearing so that the bearings are lubricated in series.

Layne conceived the idea of employing a shaft-enclosing casing for the purpose of performing said function of conveying the lubricant, admitted at the top of the casing, from bearing to bearing.

The said casing also performs the other two functions of protecting the shaft bearings from the destructive action of the sand and of alinement. It is the presence of *such a casing* performing said functions that is material. *It is such a casing* that is an *element* of the respective combinations covered by the claims in suit and concretely expressing Mr. Layne's abstract "*idea of means*" or invention.

The said claims do not cover a *process* or *method* of lubrication but a combination of *mechanical elements* including said shaft-enclosing casing performing said three functions. It must be obvious, therefore, that it is quite immaterial what kind of lubricants pass through said casing or what finally becomes of the lubricants. If the casing is used to convey the lubricants from bearing to bearing, it is performing the only function attributed to it so far as concerns the feature of lubrication.

However, whatever view may be taken of this phase of the question of infringement, the defendants' apparatus infringes according to the precise contentions and line of argument indulged in by defendants' counsel. Admitting the correctness of the line of reasoning pursued by defendants' counsel, the facts do not support the attempted differentiation forming the basis for such line of reasoning.

According to the stipulations and admission of defendants' counsel, a "*stagnant*" method of lubrication is employed in defendants' apparatus, so the charge of infringement cannot be avoided on the ground of the absence of same.

(c) *Alinement in Western Well Works Pump:*

As said in the *Getty* case: "It is also true that the Getty pump cannot be held to infringe the means that Layne used to keep his shaft properly aligned, since that was accomplished by *suspending* the mechanism from the top of the well, while Getty's pump mech-

anism receives its support *by resting on the bottom of the well.*"

In the Western Well Works pump, the mechanism is suspended, like Layne and Van Ness—pendent from the top of the well.

Referring to Figure 1 of the Halstead patent, it will be seen the shaft-enclosing casing is made up of the tube sections 8, 8*a* and the tubular hubs or couplings 23. The lubricant passes through a tube-section, then through a tubular hub or coupling section into the next tube-section and so on down to the chamber 27, excepting, of course, the heavy stagnant lubricants which remain in the casing.

Each tubular hub or coupling section 23 is just as much a constituent part of the shaft-enclosing casing as are the tube sections 8, 8*a*. The tubular hub or coupling sections and the tube sections, when assembled, form an integral structure which serves as a continuous conduit for the lubricant. Eliminate one tubular hub or coupling section and the conduit is destroyed. Furthermore, each tubular hub or coupling section does its share in preventing the ingress of water and sand to the shaft bearings. Eliminate one tubular hub or coupling section and the "closure" is destroyed and the shaft bearings exposed to the direct destructive action of the sand.

Defendants' counsel and defendants' witnesses very conveniently ignore the foregoing facts and speak of the tube sections 8, 8*a*, as constituting the shaft-enclosing casing.

The tubular hub or coupling sections or parts of

such shaft-enclosing casing are *supported and suspended* directly from the top of the well and, in turn, they support and hold in position and alinement the shaft bearings and the tube sections 8, 8a. It is thus apparent that the shaft, in defendants' structure, is kept in alinement by the intermediate bearings which are supported by the shaft-enclosing casing which is suspended from the top of the well.

The fact that such shaft-enclosing casing parts 23 are supported and suspended from the top of the well by means which, in addition to performing such function, also serve as a water-discharge casing, is quite immaterial. The material thing is the suspension of the structure from the top of the well. In the Layne patented structure, the water-discharge casing or outlet 23 is also, in effect, made an *integral part* of the shaft-enclosing casing 20 by means of the block-and-strap arrangement 26. As said in the Layne patent, page 1, line 106: "As shown in Figure 2, the shaft casing 20, and the outlet pipe 23, are *bound together* by means of the block-and-strap arrangement 26. These connecting devices are distributed at intervals along the length of the shaft casing." Such "block-and-strap arrangements" correspond to the webs 24 in defendants' structure.

It is, therefore, apparent that both in the Layne structure and in the defendants' structure, the shaft-enclosing casing and the water-discharge casing are, in effect, *one integral structure* suspended from the top of the well. And in each the shaft is suspended from the top of the well and held in alinement by

bearings supported and held in position by the shaft-enclosing casing, which is also suspended from the top of the well. In this respect each differs from the Getty structure.

"Neither the joinder of two elements of a patented combination into one integral part, accomplishing the purpose of both, nor the separation of one integral part into two, which together accomplish substantially what was done by the single element, will avoid a charge of infringement."

Pedersen vs. Dundon, 220 Fed., 309, 311.

"The mechanical substitute 'may perform some other functions, but this does not prevent it from being an infringement.' *Norton vs. Can Co.*, 45 Fed. Rep., 638."

Norton vs. Jensen, 49 Fed., 859, 868.

In *American Can Co. vs. Hickmott Asparagus Canning Co.*, 142 Fed., 141, 146, Judge Gilbert said:

"Referring to this clamping device, the appellee's expert witness, Kruse, admitted that it was 'used for the purpose of wrapping the tin,' but said that its principal use was to assist in making the first hook. *The fact that it served an additional purpose is immaterial.* . . . It is the whole purpose of the doctrine of equivalency to protect the inventor against piracy and to secure to him the benefit of that which he has invented."

As said by Circuit Judge Nelson, as early as 1852, in the case of *Tatham vs. LeRoy et al.*, Fed. Cas. No. 13,760, 2 Blatch., 474:

"A *change in form* from the construction of an existing machine, is *not a substantial change* in the eye of the patent law; nor is a *change in proportions*. These changes require no great ingenuity, at all events they do not call for the exercise of the inventive faculties. They are simply the work of the inventive faculties. They are simply the work of a mechanic of ordinary skill, and, therefore, are entitled to no particular consideration when we are inquiring into the question of identity between the construction of two machines. *So, also, the substitution of a mechanical equivalent, as it is termed, in the construction of a machine, is not a substantial change.* There are many devices in construction that can be made by a skillful mechanic, differing very much from each other in appearance, but which, in the eye of the patent law, are regarded as identical. For instance, an inventor, in the construction of his machine, desires a given power, in order to give practical operation and effect to his discovery. One mechanic may furnish the power by means of a lever, another by means of a screw—two very different instruments—yet, so far as the use of the instruments and so far as their purpose to furnish the power is concerned, they are regarded simply as mechanical equivalents, and the use of one is one machine does not distinguish that machine from a machine in which the other is found. So, too, a given power may be obtained by a spring or by a weight, or by a pulley—apparently very different devices. Yet, as they are used for the same purpose, and to accomplish the same end in machinery, they are regarded as substantially identical. It is

also proper to state, in this connection, that a patentee is not confined to the precise arrangement, in the construction of his machine, which he has described in his patent. This is obvious from the principles already stated. *Formal changes are nothing—mere mechanical changes are nothing—all these may be made outside of the description to be found in the patent; and yet the machine, after it has been thus changed in its construction, is still the machine of the patentee, because it contains his invention, the fruits of his mind, and embodies the discovery which he has brought into existence and put into practical operation.*"

D. GETTY CASE, 262 Fed., 141.

In such case the Court found the Getty pump to differ from the Layne invention in respect to certain features. *As will hereafter appear, the Getty pump also differs from the defendants' pump in respect to the same features.* In other words, the Layne and Western Well Works pump structures are substantially identical, and each differs from the Getty structure in the same respects. Therefore, this Getty decision renders defendants herein no aid in escaping the charge of infringement.

(a) The difference between the Layne and Getty structures, first mentioned by the Court and particularly emphasized, is that the Getty structure is *not suspended* from the top of the well, but is supported *on the bottom of the well.*

The Court states that the El Campo pump (which

was held *not* to infringe) was also *supported on the bottom of the well*.

As above mentioned, one of the dominating features of the Layne invention is the arrangement thereof whereby the structure may be assembled, *unit by unit*, on the top of the ground and lowered, *unit by unit*, into the well and, at the desired position in the well, held *suspended* from the top of the well.

The Getty pump structure, being one *supported on the bottom of the well*, and thus differing from Layne's *suspended* structure in respect to a dominating feature, was held by the Court not to infringe the Layne patent.

However, the pump structure of defendants herein is suspended from the top of the well and is, therefore, in that respect substantially *identical* with Layne's structure and substantially *different* from the Getty structure, as well as from the El Campo structure.

(b) Another difference between the Layne and Getty structures, mentioned by the Court, is the *absence*, in Getty's structure, "*of physical obstruction*," at the bottom of the shaft-enclosing casing, to the entrance thereto of water and detritus.

As said by the Court: ". . . Getty's partial closure is effected by balancing the pressure of the column of water outside the shaft casing against the pressure of the oil inside the casing, *without the use of physical obstruction*."

We have heretofore discussed the "*physical obstructions*" or mechanical means found in the pump of

defendants herein and operating to prevent the entrance of water and detritus into the bottom of the shaft-enclosing casing.

In regard to the *efficient* operation of one of said "physical obstructions" in defendants' structure, defendant and patentee Halstead said in his patent, in respect to that portion of brass sleeve 22 below channel 27, and which does not operate as a bearing, as follows:

"That portion of the bearing below channel 27 will not be lubricated because the upward pressure of the water being raised will *tend* to force a *small* amount of water in the direction of the arrow upward through the bearing until the channel 27 is reached where it will be drained away through auxiliary conduits 28. There being no provision for filtering the water at this point, the bearing below channel 27 will, of course, be worn by attrition, but the *major* portion of the bearing *will remain true and properly perform its function.*"

It is thus seen that such physical obstruction, operating precisely *as the packing in a stuffing-box*, prevents the passage of water and sand to such an extent that only a *small* amount can possibly get by it and such *small* amount is so reduced in volume and pressure that it passes out into the well through the conduits 28. Thus the long-sleeve bearing, above the chamber 27, is an amply sufficient *physical obstruction* to prevent the water and sand passing between it and the shaft into the casing. Of course, the down-

ward pressure of the lubricant will co-operate with the sleeve bearing in excluding the water and sand, just as in the Layne apparatus, and as said by the Court, in the *Getty* case, where the Layne physical obstructions are described as effecting closure "*aided incidentally only by the pressure of the oil column.*"

An inspection of defendants' structure, as represented by the Anderson pump, Plaintiff's Exhibit No. 4, clearly shows that defendant and patentee Halstead was correct in stating that the long brass sleeve-bearing above channel 27 would be protected from the water and sand by reason of the obstruction to the passage thereof by the part of the brass sleeve below the channel 27.

No such physical obstruction was present in the *Getty* structure and, as a consequence, the lubricant flowed freely out of the casing and the water and sand could enter freely so far as physical obstruction was concerned. Mr. Getty's testimony on this point is quoted in the supplemental brief filed in the Court of Appeals on his behalf. At page 7 of such brief, his testimony is quoted as follows:

"I fully realized that in a pump construction such as mine, when the lubricant was permitted freedom of travel downward and out at the bottom of the shaft-casing, that the water of the well would be equally free to enter the shaft-casing from below, and the said water would frequently carry with it fine, sharp, cutting sand up through the bottom bearing, and that said bearing particularly, *and perhaps some of the bearings above*, would suffer from the cutting and

grinding action of the sand. All this was fully anticipated while the pump was being planned, *but as I saw no remedy, I decided that such destructive action must be tolerated.*"

Mr. Getty evidently meant he saw *no remedy other* than by appropriating Mr. Layne's invention and, therefore, decided to endure the destructive action of the sand and water.

On page 9 of such Getty Brief, the testimony of one G. E. Tarbox is quoted as follows:

"Q. 16. When you pulled this pump (Getty), what, if anything, did you find in the casing?"

A. Nothing, excepting a very small quantity of water and sand.

Q. About how much sand?

A. About a handful.

Q. And whereabouts in the casing did you find this sand?

A. Immediately around the top of the bottom bearing.

Q. How long had this pump been in operation before you pulled it?

A. Why, the pump, as near as I can tell, was installed some time in February, 1914, and was pulled, I think it was, Sunday, June 30, 1915."

A very different situation is presented by the Anderson pump, "Plaintiff's Exhibit 4," one of defendants' structures. An inspection thereof shows no water or sand have entered the casing; the bearings and shaft are bright and smooth and, when pulled and as it now remains, the shaft is covered with quantities of heavy grease.

Obviously, there could be no free flow of lubri-

cant through defendants' shaft-enclosing casing and no free flow of lubricant through defendants' shaft-enclosing casing and no free flow of water and sand into such casing. The proofs demonstrate the contrary. The heavy, stagnant lubricants which remain, for years, in the casing and on the shaft and above the bearings, would prevent even a free flow of the lighter emulsifying oil and certainly there is no free flow of such stagnant lubricants.

The condition of the Anderson pump demonstrates that the "*physical obstructions*," aided by the lubricants, have excluded the water and sand. There is, therefore, a substantial *difference* between defendants' structure and Getty's in respect to *closure*. On the other hand, there is a substantial *identity* between defendants' structure and Layne's in respect to *closure*.

(c) The third difference between the Layne and Getty structures, mentioned by the Court, was the continuous and free flow of oil through the Getty casing and out of the bottom thereof. The complete freedom of such flow is shown by the testimony of the witness, Tarbox, above quoted. On pulling a Getty pump, after a year and a half use thereof, he found only a little water and sand in the casing. *He found nothing else.* No lubricant remained.

The proofs show and defendants' witnesses and counsel admit that, *after years of use*, quantities of the original heavy grease, applied at the time of installation, remain in defendants' shaft-enclosing casing and on the shaft and above the bearings and, as Mr. Doble testified, in the spiral grooves in the bearings. On

this point, Mr. Doble, Jr., said of defendants' Selby ranch installation:

"MR. WHITE—Q. Did you examine one of these spiral bearings, or grooves in the bearings?

A. I did.

Q. What did you find with regard to its condition?

A. It was filled with grease."

With said heavy grease in the casing, on the shaft and in the spiral grooves of the bearings and *thus being found after years of use*, it is obvious that even the lighter, emulsifying oil could not flow freely through defendants' shaft-enclosing casing.

As stated before, Layne's patent claims respectively cover combinations of *mechanical* elements. One of said elements is the shaft-enclosing casing, which is used as a *closure* against the destructive action of the detritus in the water being pumped; also, as a *means* of supporting and holding in *alinement*, the shaft bearings and shaft and also as a *conduit* through which lubricant may be applied to the bearings in series. In our opinion, it is *quite immaterial* whether or not the lubricant flows freely or otherwise. The claims do not cover a *method or process* of lubricating, but merely a combination of mechanical elements of which one serves as a *conduit* for lubricants as well as performing other functions in respect to the work done by the combination as a whole. In his opinion herein, Judge Dietrich expresses the same view on this question.

The Court, in the Getty case, having found the

Getty pump not to be a *pendent* structure and not embracing a *substantial closure*, evidently referred to the so-called "circulatory" lubrication as illustrating the absence of any substantial obstruction or closure at the bottom of the shaft-enclosing casing. We cannot, for a moment, believe the Court would have found such Getty structure non-infringing if it had been *suspended* from the top of the well and had embraced a substantial closure *which did protect the shaft-bearings from the destructive action of the sand*.

In other words, closure at the bottom of the conduit must be sufficient to protect the shaft-bearings from the destructive action of detritus. *But such bottom closure is immaterial as a feature of lubrication*. When the lubricant reaches the bottom of the casing, it has completed its lubricating function.

However, there is no similarity between the Getty so-called circulatory system and the defendants' "*stagnant*" system in which the heavy lubricants remain in the casing for years. Also, the mere fact that some of the emulsifying oil and possibly some of the heavy grease, passes out of the bottom of the defendants' casing is immaterial. In the Layne structure, lubricant likewise passes out of the bottom of the casing. This fact is expressly found in the *Getty* as well as in the *Van Ness* cases. In the *Getty* case, the Court says that the Layne mechanical means *plus* "the downward pressure of the column of oil in the shaft-casing, accomplished his closure." Of course, the oil could not aid in excluding the water unless the oil

itself was able to pass down the passage up which the water tended to flow. Layne's testimony herein is to the same effect.

The sum and substance of this Getty decision is that the finding of non-infringement is predicated upon substantial differences in respect to *all three* of the functions performed by the shaft-enclosing casing in respect to alinement, closure and lubrication. The decision is not based on any one difference but *upon all the differences*. It is the *aggregate* of the differences that prompted the Court to find the Getty structure to be substantially different from the Layne structure. As said by the Court, in conclusion:

"Referring the closed shaft of Layne to the description in the specifications of his patent, as we must do, we think the differences from Getty's mechanism with respect to means of alignment, lubrication, and closure, are so important that Getty's differing means should not be held to be mechanical equivalents, and should not be held to infringe the *closed* shaft of Layne's patent."

In view of the foregoing, it cannot be said that this decision determines a difference, in respect to only one of said features, would be sufficient to sustain a defense of non-infringement.

E. PROFESSOR LESLEY'S TESTIMONY

In the majority opinion of the Court of Appeals, reference is made to the testimony of defendants' expert, Professor Lesley. As the majority opinion evidently places great reliance thereon, it might

suffice to call attention to the fact that Judge Dietrich, in the court trial, heard Professor Lesley give his testimony, observed his demeanor on the stand, heard the testimony of plaintiff's witnesses contradicting and disputing Professor Lesley's testimony, and determined the facts against the assertions of Professor Lesley.

As stated before, Professor Lesley's testimony is most significant in respect to experiments and tests he did not make and to questions not asked him by defendants' counsel.

Most of his testimony was based on experiments made with a pump structure specially installed, for the purposes of his tests, on the farm of E. W. Conant, father of the Western Well Works' engineer.

This pump structure was not proved to be a standard construction like the Anderson and other structures sold by defendants. Admittedly, the shaft-enclosing casing permitted water to enter at the respective joints between hubs and tube sections. In this respect, it differed substantially from the Anderson pump admitted by defendants' counsel to have tight joints sealed with white lead.

The professor's tests with such a *special* structure, not proved to be substantially identical with defendants' standard product, necessarily could have no value.

Query: Why did not defendants have Professor Lesley test a standard construction that had been sold and was in successful operation to the full satisfaction of the user thereof?

As said by Judge Dietrich:

"THE COURT—If you intend to show that, you may proceed; but it would be immaterial to show that any particular pump leaked, except perhaps by way of illustration of a general statement of opinion or theory on his part, that it would be practically impossible to construct a pump in the manner in which this is constructed that is water-proof" (R., 743).

However, Professor Lesley made no such general statement because defendants' counsel refrained from asking him any question which might call forth an opinion of such nature. Counsel refrained from asking such a question notwithstanding the following colloquy made it almost obligatory on his part to do so if he expected the professor's experiments to be accorded any weight:

"THE COURT—Is it your contention, Mr. Townsend, that the witness will testify that a mechanism constructed in the manner in which apparently this one was, with the use of white lead in the joints, cannot be made water-tight?

MR. TOWNSEND—Cannot be made water-tight?

THE COURT—Yes.

MR. TOWNSEND—That would be perhaps a difficult proposition to prove.

THE COURT—A man who is an expert in mechanical construction ought to be able to express an opinion about that" (R., 742).

Professor Lesley was not asked to express any such opinion.

Also, in respect to the lubricant used and the

vibration of the shaft, such test pump admittedly differed from standard construction. The professor admitted that, in defendants' structure at Stanford University, heavy cup grease was applied but no use thereof was made in the Conant specially prepared test pump (R., 765). There was appreciable vibration in such special "test" pump, but the Stanford installation was "rather free from vibration." It was "not enough to have any appreciable effect,—enough that I could observe," said Professor Lesley (R., 762).

Furthermore, his experiments with his specially designed apparatus, embracing bearings having spiral grooves, were not under working conditions. He made tests with water and with water and oil. Why did he not test such apparatus after the application thereto of graphite grease, cup grease and heavy oil? With the grooves filled with heavy grease, as Mr. Doble found them at the Selby ranch? Why did he not measure the rapidity of flow of such heavy grease through such grooves? He did state the pressure increased with an increase of viscosity. Is it not apparent that the rapidity of flow would necessarily decrease with such an increase of viscosity? The presence of such heavy grease on the shaft, above the bearings and in the grooves, after long use, shows that such heavy grease does not move through the grooves with rapidity but must be moved only at an exceedingly slow rate. Otherwise, the grease would have disappeared from all but the lowest tube-section at the top of which is located the last bearing having grooves. The professor's failure to measure such rate

of flow while measuring the pressure, suggests that possibly the exact rate of flow was not desired to be ascertained because it was feared same would be inconsistent with defendants' contentions.

Judge Dietrich's attitude, towards Professor Lesley's testimony and tests, is indicated in the following remarks:

"THE COURT—That is true, but tests might have been made of regular installations. As I have suggested, the difficulty about this is not that the Court is going to find there was any bad faith in a particular experiment, especially on the part of Professor Lesley, but the question, however, is as to whether or not the installation here was made precisely as installations ordinarily made. It appears to the Court that it would be very easy to affect the operation of this pump in respects to which you refer by slight changes in the actual installation. It may or may not be that there would be this circulatory system rather than that the system would act as a circulating system of lubrication if no water entered the tubing. Possibly the water has something to do with making efficient the circulation of the oil. There is this further suggestion in connection with this particular installation as it appears from the testimony of Professor Lesley, that when it came to installing the pump at Stanford University, there was apparently introduced into the tubing the usual amount of hard grease, or heavy oil—that which was somewhat immobile, at least, whereas, for some reason, that was omitted from the particular installation at which the test was made. It does not appear why. It may or may not be that that has something to do with the entry of water into the tube, or the circulation of water, or the circulation of the oil."

F. DEFENDANTS' STRUCTURE EMBODIES ALL ELEMENTS OF THE RESPECTIVE COMBINATIONS COVERED BY GENERIC CLAIMS 9, 13, AND 20.

From the foregoing, it is apparent that defendants' structure embodies each and every element specified in the three claims held infringed. The said elements are interrelated and combined together in defendants' structure in precisely the same way as disclosed in the Layne patent and perform the same functions to accomplish the same result. As found, *as a fact*, by Judge Dietrich herein, in respect to the Layne patented structure and defendants' structure:

"While in the unassembled parts there are many minor differences of construction, in the assembled structures I find no substantial distinction. Both accomplish the same result by substantially the same means, operating in substantially the same way."

In other words, defendants' structure is a deep-well pump mechanism, adapted to be assembled, *unit by unit*, at the mouth of the well-bore, and lowered, *unit by unit*, into the well-bore and, when completely assembled and lowered, to hang *pendent* from the surface, like a plumb-bob; said mechanism consisting of, in combination:

- (1) a *pump-impeller* attached to a
- (2) *sectional line* or *power-shaft* extending to the top of the well;
- (3) a *pump-casing* enclosing the pump-impeller;

- (4) a *water-discharge sectional casing* extending from the pump-casing to the top of the well;
- (5) a *sectional shaft-enclosing casing* extending from the pump casing to the top of the well, said casing being provided at each end of each section with a fixed block with bearings for the shaft and being closed at the top and provided with an air vent, and said casing being adapted to:
 - (a) hold the line shaft in alignment by means of said bearings fixed within said casing at suitable intervals;
 - (b) protect the line shaft and its bearings from the destructive action of the sand and other detritus carried by the water being pumped.
 - (c) form a conduit for lubricant from the upper end thereof down through each shaft-bearing therein, thus lubricating all the shaft-bearings, in series.

MECHANICAL EQUIVALENTS

LAYNE PATENT NOT LIMITED TO THE PRECISE DETAILS
OF CONSTRUCTION SHOWN IN DRAWINGS.

We challenge defendants to show in the prior art any pumping mechanism wherein the power-transmitting shaft is associated in combination with an enclosing conduit or pipe, which conduit or pipe is made in sections, whereby the enclosing conduit is made to perform the three functions of:

- (1) holding the power-shaft in alignment by means of bearings fixed within said casing at suitable intervals;
- (2) enclosing and protecting the line-shaft and such bearings from the destructive action of sand and other detritus carried by the water being pumped;
- (3) a conduit for lubricant from the upper end thereof down through each shaft-bearing therein, thus lubricating all the shaft-bearings, in series.

This was a broadly novel conception. It was an invention of great merit, as shown by the litigation over it.

Such a pumping mechanism was revolutionary in the art. It filled a long-felt want. It solved the problem of the dug-pit. It permitted deep bored or drilled water wells and obviated all requirements of man entering the well-hole.

This Layne invention was one of *very great merit*. It was fundamental and generic in character. After it was produced, it was generally adopted and used. Such enclosed line-shaft pumping mechanism has become the standard. It has driven all predecessors from use.

While the Layne invention may not have been a truly "*pioneer invention*," within the strict definition thereof in patent law, yet its revolutionary character is such as to stamp it entitled to the liberal interpretation of the courts.

As said by this Court in *Continental Paper Bag Co. vs. Eastern Paper Bag Co.*, 210 U. S. 405, at page 415:

"It is manifest, therefore, that it was not meant to decide that only pioneer patents are entitled to invoke the doctrine of equivalents, but that it was decided that the range of equivalents depends upon and varies with the degree of invention."

We submit that the majority of the Court of Appeals erred in treating the Layne invention as a narrow invention, limited to details of construction, and in denying to such invention any range of mechanical equivalents. We submit that, on the contrary, the rule applied by this Court in *Hildreth vs. Matoras*, 42 Sup. Ct., Rep. 21, should have been applied. That the claims of the Layne patent should be construed and interpreted to cover the very substantial change in the well mechanism art made possible by Mr. Layne's broad inventive idea.

LAYNE'S ENCLOSED LINE-SHAFT PUMP NOVEL

FORTY-THREE YEARS OF DEVELOPMENT IN ART IMMEDIATELY PRECEDING LAYNE'S INVENTION PROVES IT NOVEL.

As said in the *Van Ness* case, Layne's invention "*filled a long-felt need*" in the art. Defendants' proofs, of forty-three years of development in this art, clearly show the nature of such "need" and wherein numerous prior inventors *failed* to solve the problem of supplying such "need."

1. CRANNELL PATENT

The prior patent, most relied on herein and heretofore discussed in the *Van Ness* case and other cases, is that issued on April 15, 1890, to Charles W. Crannell for "Compound Pump." Admittedly, this is a mere *paper* patent that never had any influence on the progress in this art and which discloses a device that was never used. This alone indicates some fatal defect inherent in Crannell's apparatus.

As said by this Court in *Carnegie Steel Company vs. Cambria Iron Works*, 185 U. S., 421:

"This defense presents the common instance of a patent which attracted no attention, and was commercially a failure; being set up as an anticipation of a subsequent patent, which has proved a success, because there appears to be in the mechanism described a possibility of its having been, with some alterations, adaptable to the process thereafter discovered."

Figure 1 of the Crannell patent is reproduced on the opposite page. An inspection thereof discloses that the Crannell pump was designed only for low lifts. It is perfectly apparent that it would be wholly impractical for deep wells. It is, of course, equally apparent that it could not be used in the small bore of a well. It embraces many of the objectionable features found in the "pit pump" installations and which features Mr. Layne sought to and did eliminate by his invention.

This Crannell pump requires the digging of a pit

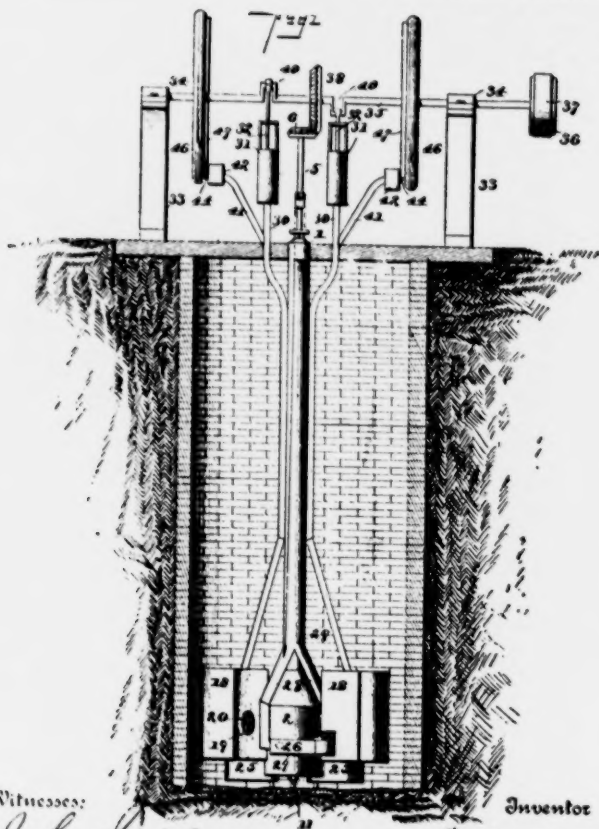
(No Model.)

2 Sheets—Sheet 1.

C. W. CRANNELL.
COMPOUND PUMP.

No. 425,933.

Patented Apr. 15, 1890.



Witnesses:

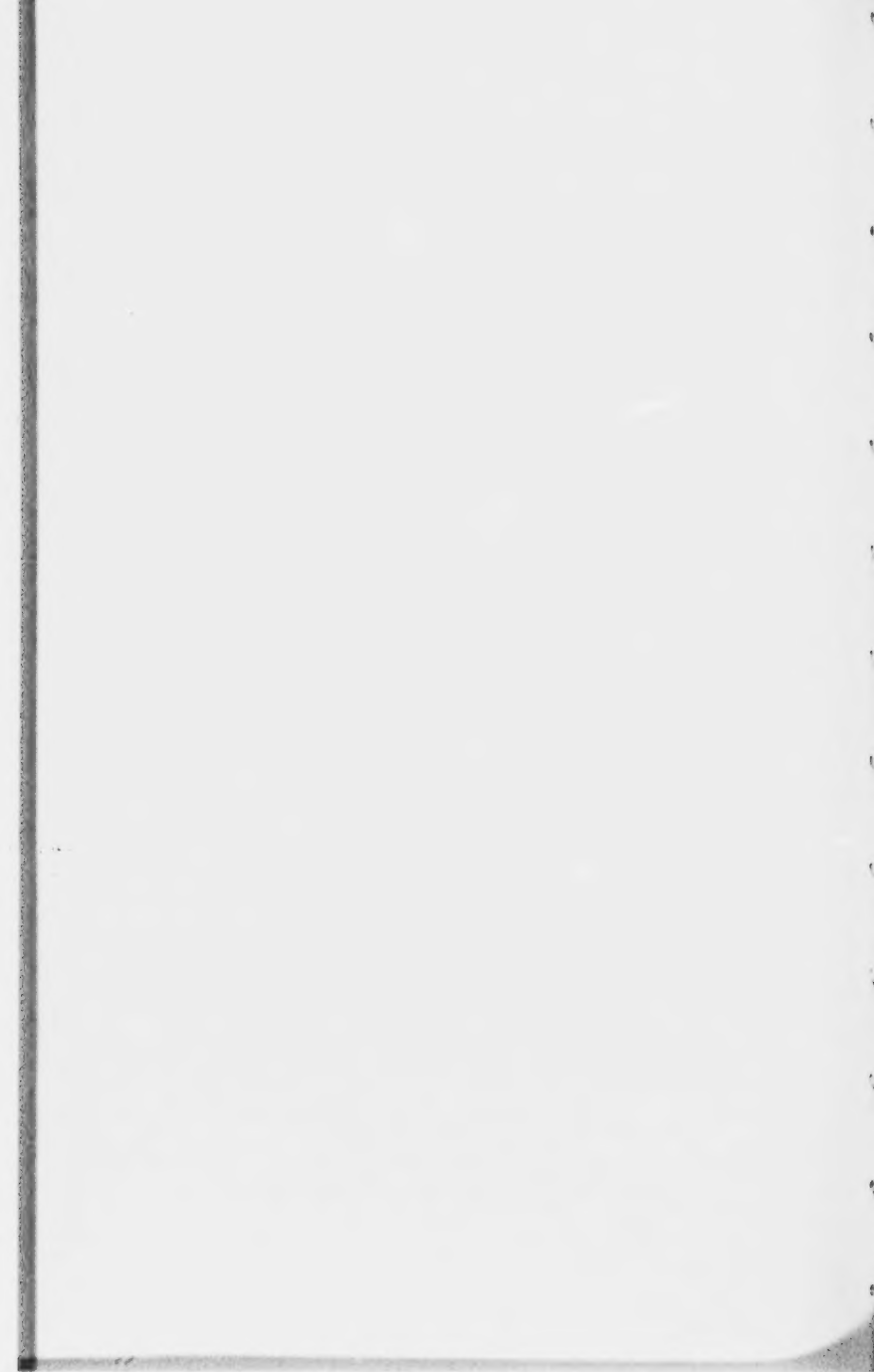
John Irvine
W. S. Dewar

Inventor

Charles W. Crannell

By his Attorneys

Cash & Co.



within which the pump is installed by mounting the pump on the bottom of the pit. In other words, it is not adapted to be suspended from the top of the well or be assembled, *unit by unit*, at the top of the well and then be lowered, *unit by unit*, into the well. To install said pump and thereafter keep same in repair, it would be necessary for man to enter the pit. Such operations would require the water in the pit to be first removed. The said pump is not adapted to be raised or lowered in the well according to the variations in the level of the water therein.

This Crannell structure discloses no solution of the problems confronting Layne and contains no suggestions of such a solution.

On the contrary, the Crannell pump does not provide, in a pendent power-transmission (a) a tubular enclosure associated with a series of shaft-supporting and alining bearings spaced at suitable intervals along the shaft, thereby supporting the shaft; nor (b) a tubular enclosure substantially *protecting* the shaft and alining bearings from the water in the well, and being pumped, and from sand or other detritus carried by such water; nor (c) a tubular enclosure forming a *conduit to convey the lubricant* to the several bearings of the shaft in series. The Crannell patent, in fact, does not in any manner solve the problem, which was presented to Mr. Layne, of how could he assemble the necessary intermediate bearings and still use a tubular conduit about the pump-shaft and utilize such conduit to effect *alinement*, *protec-*

tion and *lubrication* of the bearings in series. As will hereafter appear, the inventor and patentee, *Alvord* (an engineer of years of experience in this art), was unable to solve such problem, which proves the solution thereof was not obvious even to an inventor in this art. The disclosure of the Crannell patent would teach an ordinary mechanic in the well art (having knowledge of the Layne invention derived from the Layne patent or installations) to install a pump in a large open pit and rest the installation on the bottom of the pit. It would not suggest to him a *pendent* structure installed in a bored well. It would not suggest to such mechanic the idea of assembling the pump-shaft bearings and enclosing conduit or tube, section by section as units above the ground, as conceived and patented by Layne and as copied from Layne by the defendants. The general construction of the pump and of the air chambers of the Crannell patent would preclude the possibility of such pump being used in a bored well.

The drawing and description in the Crannell patent clearly indicate that Mr. Crannell did not appreciate the necessity of lubrication of the bearings through the pump stock. Should an attempt be made to introduce lubricant into the "pump stock" of the Crannell patent, such lubricant *could not reach the shaft-bearing*. On the contrary, it would escape into the water being pumped and this without doing any useful work of lubrication whatever. *The only bearing shown in the pump is bearing 9, below the triple-bladed screw*. No means are suggested for lubricat-

ing this bearing. In such a structure, none could be provided. This bearing is exposed to the water in the well and being pumped. No protection therefor is provided. In such a structure, none could be provided. Any sand or detritus, carried by the water, would immediately cut this bearing. The pump would not last three hours under such conditions, *any more than did the United Iron Works' unprotected bearing pump installed on a Palo Alto ranch, as testified to by the defendant Vaughan.*

This Crannell patent conclusively shows that Crannell had no conception of a deep-well pump. No one, searching the art and having no previous knowledge of the Layne patent or invention, would receive any suggestion whatever from this Crannell patent of building a well mechanism of the Layne type wherein is provided a shaft *alining* and *protecting* casing, which includes a plurality of shaft alining and supporting bearings in series spaced at suitable intervals therein, whereby a *conduit* is provided to convey the lubricant to the several shaft-alining and supporting bearings in series and whereby provision is made so that the several bearings may be inserted or assembled and held in position, and which conduit *protects* the shaft and the bearings from the action of the water in the well and being pumped, and from any sand or detritus carried by the water.

It is interesting to note that Crannell devised a mechanism which included a tube surrounding part of the pump-shaft, yet he did not appreciate the possi-

bilities of the Layne invention. His approximation did not lead him to a conception of the exceedingly simple, efficient and remarkably valuable Layne invention. The Crannell patent, instead of anticipating or limiting the scope of the Layne invention, serves on the contrary to emphasize its character as an invention. The Crannell patent shows conclusively the meritorious character of Layne's conception. As said by this Court in *The Barbed Wire Case*, 143 U. S., 282:

"Under such circumstances courts have not been reluctant to sustain a patent to the man who has taken the final step which has turned a failure into success. *In the law of patents it is the last step that wins.*"

Judge Jack, presiding at the trial of *Getty vs. Layne*, in the District Court, seemed to think insertion of intermediate bearings in the Crannell disclosure very similar to inserting additional fence posts in a fence. Judge Jack, however, failed utterly upon his mechanics. He overlooked the fact that, to insert such intermediate bearings was not *mere* insertion of intermediate bearings. The problem was, *how could such intermediate bearings be placed in position; how could they be supported; how could they be alined?* How could these things be done and yet avoid the necessity of man entering the well-hole? How could the enclosing conduit be made to support and permit the insertion of such intermediate bearings and how could lubrication of all these bearings be provided?

The fact that this *was a problem* is demonstrated by the *Alvord* patent No. 735,690, hereinafter discussed. Alvord wanted to insert intermediate bearings. So he had to depend upon water lubrication. *He had to permit the water to carry sand and detritus into his bearings.* Why? Because, to insert such intermediate bearings, he could conceive no method other than to provide *openings* at stated intervals along his enclosing pipe so that the intermediate bearings could be put in place and alined. This is not our thought; *this is the fact as shown by the record.* Mr. Alvord could perceive no other solution of the problem.

We submit that the Court is not going to decide this case upon mere speculation. Like any other law-suit, the case is to be determined upon proofs. The proofs here are that Crannell did not have the Layne idea; Crannell did not have any idea of intermediate bearings; he did not have any idea of how he could assemble such bearings or lubricate them or protect them or hold them in alinement. The *proof* is that Alvord *could not solve* such problem *and he was an inventor in this art.* On the contrary, the proof is that Mr. Layne was the first man in the art who ever conceived an enclosed line-shaft construction whereby the pump-shaft could be surrounded by an enclosing conduit and such enclosing conduit provide for the alinement and support of the necessary intermediate bearings, and also provide for the lubrication in series of such bearings and provide for a sufficiently tight shutting off or closure of the pump-

shaft bearings from the water being pumped and the sand and detritus carried thereby to insure the life of such power-transmitting mechanism.

The Crannell patent is discussed by plaintiff's witness, W. A. Doble, Sr., at page 825 of the record.

2. EISLER PATENT

The Eisler patent, like the Crannell patent, was before the Circuit Court of Appeals for the Fifth Circuit in the Layne patent litigation above referred to.

This Eisler patent, issued on July 3, 1894, also discloses a low lift pump arranged to be supported on the floor of an open flume or canal. This structure is not one capable of being assembled, *unit by unit*, at the top of the well and, *unit by unit*, lowered into the well and there hang pendent. It does *not* embrace any shaft-enclosing casing which, like Layne's, functions to *protect* the shaft and bearings, to *aline* the shaft-bearings and to form a *conduit* for lubricant.

This patent is also discussed by plaintiff's witness, Doble, at page 825 of the record. As said by him, the bearings therein are not protected from the destructive action of the sand, etc., in the water being pumped. Furthermore, no lubricant is conveyed to said bearings by means of any casing enclosing the shaft-bearings.

This Eisler structure, with its unprotected bearings, would last no longer than did the United Iron Works' pump, referred to by the defendant, Vaughan,

and which became inoperative within a few hours by reason of the unprotected shaft-bearings being destroyed by the sand in the water being pumped. Said pump was replaced by one of defendants' structures which operated successfully solely because it embodied Layne's invention.

3. IVENS PATENT

This patent was issued in July, 1902. It obviously does not disclose or suggest the Layne invention.

4. ALVORD PATENTS

The three patents issued to J. W. Alvord of Chicago, Illinois, are of great importance in respect to conclusively proving the difficulty of the problem solved by Layne and the fact that it required invention, of a high order, to solve such problem.

The Alvord patents are respectively numbered 735,690, 735,691 and 735,692, and were all issued on August 11, 1903. The first one was applied for on November 17, 1902, and the last one on March 30, 1903.

Mr. Alvord was, therefore, an inventor who was attempting to solve the deep-well problem *shortly after the time* when, in April, 1902, Mr. Layne made his invention. Both these inventors, therefore, had the benefit of the same prior art relied on herein by defendants and disclosing forty-three years of development in this art.

If such prior art, as contended by opposing counsel,

was *so suggestive* of Layne's solution of the problem that any ordinary skilled mechanic could have solved such problem in the way Layne did, then we would naturally expect to find Mr. Alvord, an *inventor*, not merely a mechanic, also being able to solve such problem.

However, the Alvord patents show Alvord's efforts resulted only in an inoperative structure. Notwithstanding all the "*alleged suggestiveness*" of the prior art, relied on herein, said art did not, *in fact*, suggest to the *inventor*, Alvord, a successful solution of the problem. In other words, the Alvord patents *show* "*what was not seen*" by an inventor in this art, who was almost a contemporary of Mr. Layne.

As said by this Court in *Diamond Rubber Co. vs. Consolidated Rubber Co.*, 220 U. S., 435:

"Knowledge after the event is always easy and problems once solved present no difficulties, indeed may be represented as never having had any and expert witnesses may be brought forward to show that the new thing which seemed to have eluded the search of the world was always ready at hand and easy to be seen by a merely skillful attention. *But the law has other tests of the invention than subtle conjectures of what might have been seen and yet was not.*"

The Alvord defense is not a new one. Mr. Alvord testified on behalf of the defendant in the *Van Ness* case, wherein he stated he was the patentee to whom were issued the said three Alvord patents.

The Alvord tube, surrounding the shaft, is not

intended to and *cannot protect* the shaft and bearings from the destructive action of the detritus carried by the water being pumped. Furthermore, said tube is not intended to and *cannot operate as a conduit* for conveying lubricant to the bearings. Alvord was compelled to rely on the water itself to lubricate the bearings and, as the record shows, the detritus, carried by such water being pumped, will destroy unprotected bearings within a few hours.

The Alvord patent No. 735,690 shows a construction in which every intermediate bearing for the pump shaft is *directly open to the water being pumped from the well*. Sand or other detritus, carried by the water, may enter the bearings. *The bearings are not protected in any sense*. This alone is sufficient to demonstrate the utter lack of pertinency of the so-called Alvord invention to the issues of this case. Alvord had to depend upon water lubrication because he was unable to provide means to convey oil to his shaft bearings. This patent does show that Mr. Alvord contemplated enclosing the pump shaft in a tube 7. He also contemplated the insertion of intermediate bearings for the shaft, but, in order to assemble his intermediate bearings, etc., it was necessary to provide an opening through the pipe or "shaft-tube" just above each bearing. In addition to the holes in the "shaft-tube" opposite each bearing adjusting-screw 15, said tube is open, to the water being pumped, at the slots 19. The result of this was that the water being pumped was free to flow into the "shaft-tube" just above

each bearing and through each slot 19. And sand or detritus carried by the water was, therefore, carried *directly* to the bearings. The result of such construction would be the same as that testified to by defendant Vaughan. Mr. Vaughan admits the pump at the Selby ranch (installed by the United Iron Works) lasted only a few hours because of the destructive action of the sand upon the bearings. *This was due to the lack of Layne's protective casing.* The reason for Mr. Alvord requiring the openings through his "shaft-tube" just above each bearing was to enable the assemblage of the devices in their respective relations and positions. Without such openings Alvord could not assemble his structure. With said openings therein, his tube cannot form a conduit for lubricant and cannot protect the bearings. Layne, however, provided such a relation of his sectional shaft-enclosing conduit and intermediate bearings so that the necessary intermediate bearings could be assembled and could be protected, held in alinement and lubricated in series. This was and is impossible without entire rearrangement, reconstruction and redesigning of Alvord's mechanism.

How Alvord's scheme could be used without providing the openings through the "shaft-tube," just above each bearing and slots 19, is not apparent. *Alvord never conceived how it could be done.* He never showed how it could be done. And it remained for Mr. Layne to provide such a combination as would insure the lubrication and protection of the interme-

diate bearings. This Alvord patent No. 735690 is a very fine illustration of how *not* to accomplish the desired results sought and secured by Layne.

The Alvord patents Nos. 735691 and 735692 do not illustrate the "shaft-tube" and intermediate bearings. This feature of Alvord's ideas is covered by his patent No. 735690.

There is nothing at all comparable in this Alvord patent No. 735690 with the Layne enclosed line shaft invention having its features of lubrication, alinement and closure. This Alvord patent illustrates the paucity of the prior art *rather than placing any limitation whatever upon the scope of the Layne invention.*

DEFENSE OF PRIOR INVENTION BY BYRON JACKSON.

Defendant's answer pleads that the Layne patent, and particularly Claims 9, 13 and 20 thereof, are void for the reason that the subject matter thereof was invented by Byron Jackson, of San Francisco, California, prior to the alleged invention thereof by Mr. Layne. (Par. XV of amended answer, R. p 26.)

However, defendants make no contention that Byron Jackson ever built any anticipating pump. The first pump made by him and claimed by defendants, to embody Layne's invention, was not built until December, 1903, or January, 1904, almost eight months after Layne's constructive reduction to practice by the filing of his patent application on April 28, 1903.

In the Circuit Court of Appeals for the Ninth Cir-

cuit, defendants' attorneys expressly disclaimed making any contention that Byron Jackson ever made any anticipating pump. In defendants' brief filed in said Court, at page 40 thereof, defendants stated:

"Let it be clearly understood at the outset that defendant does not contend that the Byron Jackson pump was *completed and operated* prior to Layne's filing date. Such 'completion and operation' are *not* necessary to a defense of *prior invention or prior knowledge*. (Italics defendants'.)

We shall discuss this Byron Jackson defense because, although *not* herein sustained by the Circuit Court of Appeals, it is referred to by Judge Morrow in construing the Layne patent claims *as being limited to a shaft casing from which no lubricant escapes*.

The same Byron Jackson defense was also held *not* sustained in the case of *Layne & Bowler Corporation vs. American Well and Prospecting Company et al.*, in the United States District Court for the Southern District of California, by Special Master Lynn Helm, appointed to hear, try and determine that case.

The uncontradicted proofs show Layne conceived his invention as early as April, 1902.

As Layne exercised *reasonable diligence* in filing, on April 28, 1903, his application for letters patent on his invention, the *date of said invention* must be deemed to be April, 1902.

Therefore, to sustain this Jackson defense, it was necessary for defendants to prove that, prior to April,

1902, Jackson conceived the same invention and, with *reasonable diligence*, either reduced the same to practice or filed an application for letters patent thereon.

However, defendants failed to introduce any proofs showing even any completed "*conception*" by Jackson prior to the filing of Layne's application on April 28, 1903. Furthermore, defendants' proofs disclosed that Jackson *never* applied for letters patent on such invention, and the first pump, made by him and claimed to embody Layne's invention, was not built by Jackson until *about eight months after the filing of Layne's application on which was issued the letters in suit*.

From the foregoing, it is apparent that, even though it were *admitted, contrary to the proofs*, that Jackson had a *mental conception* of said invention prior to Layne's conception, nevertheless Jackson could not be held to be a prior inventor *because he exercised no diligence* in reducing his mental conception to practice and, therefore, could not be entitled to the *date of his mental conception* as the *date of his invention*. As said in *Robinson on Patents*, at page 150:

"Section 961. Third Defense: Denial that the Alleged Inventor was the first Inventor of the Patented Art or Instrument.

The third defense consists in a denial that the patentee or his assignor performed the inventive act producing the alleged invention *at an earlier date than any other inventors in this country*. This defense concedes that the patentee or his assignor is a true inventor of the art or article in question,

but denies that he was its *first* inventor. It is equivalent to either of two averments: (1) 'That rival inventors had completely conceived the idea of means embodied in the invention, *and were using diligence in reducing it to practice at the time when the patentee or his assignor conceived the same idea*; or (2) that although the patentee or his assignor had *first conceived* the idea, *he did not use due diligence in reducing it to practice, and that in the meantime some later conceiver but more prompt reducer had perfected the invention*. This defense raises the same issue which is presented in interference cases in the Patent Office and in proceedings in equity to annul a rival patent, and is sustained when the evidence establishes either one of its equivalent averments."

As defendants made no attempt to fix the date of Jackson's alleged conception by reference to any proofs showing a completed conception, in our Brief in the Circuit Court of Appeals, we stated:

"It is to be noted that defendants, in their Brief do not attempt to point out *when* Byron Jackson had a complete conception of the Layne invention. Defendants do not refer to any written description, to any letter or to any drawing, completed prior to Layne's filing date or prior to the date upon which Layne's application was signed (April 3, 1903), from which the Court can find a completed idea or conception of the Layne invention."

Prior to referring to this Jackson defense, Judge Morrow, in his opinion, found, *contrary to the finding of the Circuit Court of Appeals for the Fifth Circuit*, that Layne's shaft-casing did not perform the function of alining the shaft bearings and shaft. He then found

that Jackson had a conception of other features of the Layne invention excepting the alleged complete closure of the Layne shaft-casing. In support of such finding, Judge Morrow quotes from numerous letters written *after* Layne executed his application for the letters patent in suit and in one of which letters, dated April 29, 1903, Jackson admits "*no such pump had been developed.....*" This admission, alone, was sufficient to negative any contention that Jackson, prior to said letter or prior to Layne's application, had a *complete* mental conception of *any* proposed pump discussed in the letter. So far as Jackson was concerned, his ideas, at that time, were still inchoate.

Furthermore it is to be noted that Judge Morrow, like defendants' attorneys, failed to point out *when* Jackson had a *complete conception* of *any* invention and failed to refer to any written description, to any letter or to any drawing, completed prior to Layne's application date or prior to the date upon which Layne's application was signed (April 3, 1903), from which the Court could find a completed idea or conception of the Layne invention. Judge Morrow's views, in reference to the Jackson defense, were evidently based on what appeared in Jackson's letters written *after Layne had filed his patent application*.

Furthermore, Judge Morrow failed to discuss and apparently failed to consider the *question of diligence* in determining the *date* when Jackson could be said to have made a completed invention of any character.

As said before, *admittedly Jackson made no anticipating pump and did not make any pump*, claimed by defendants to embody Layne's inventions, *until about eight months after Layne filed his patent application*. And, in such *subsequent Jackson pump*, Judge Morrow did *not* find embodied the Layne shaft-casing performing the function of alining the shaft-bearings and shaft.

From the foregoing outline of the situation, it is apparent the Byron Jackson defense should have no effect on the scope of Layne's patent claims. The said defense was also overruled by trial Judge Dietrich and by Circuit Judge Gilbert. It was also overruled by the Special Master in the case of *Layne & Bowler Corporation vs. American Well and Prospecting Company et al, supra*.

Judge Morrow's findings herein may be attributed to his confusion of the various and very differently functioning casings mentioned in the Layne patent claims in suit. In his opinion, at page 1127 of the record, (276 Fed. top page 468), Judge Morrow made the following findings:

"We find also that the combination with a 'pump-casing' mentioned in clause 2 of claim 9, the 'closed casing surrounding the pump-shaft' mentioned in clause 5 of claim 9, the 'sectional casing' mentioned in clause 4 of claim 13, the 'casing being closed at the top' in clause 8 of claim 13, and the 'well-casing' of clause 2, claim 20, by which the pump is 'entirely closed off from the

water in the well' mentioned in the last two words of clause 4 and in clause 5 of claim 20, perform the same function . . . "

In said quotation, *three* separate and distinct casings, respectively performing entirely different functions, are spoken of as being *one and the same thing and performing the same function*.

The "Pump-casing," of claim 9, is numbered 21 in the Layne patent and, as clearly shown in Figure 1, is the casing that encloses the pump impellers. Judge Dietrich carefully notes this in his opinion. Obviously, said casing is not closed off from the water in the well. In order to operate the pump, the well water is permitted to enter the bottom of said casing 21 and said water, by the rapid rotation of the impeller within said casing, is forced out of said casing and up through the water discharge pipe 23 to the surface of the ground.

The "closed casing," of Claim 9, is the shaft enclosing casing numbered 20 in the Layne patent. This casing is supported at the top of the well and hangs pendent therein, like a plumb-bob. So hanging in a vertical plane, it maintains in vertical alinement the shaft-bearings mounted therein and thus maintains the shaft in vertical alinement. This casing also forms a conduit down through which the lubricant passes and lubricates, in series, the said shaft-bearings. This casing also prevents the water and sand therein from coming in contact with the shaft bearings and thus destroying them.

The "well-casing," of Claim 20, is numbered 16 in the Layne patent and forms an inner lining for the well-bore to prevent caving in of the ground surrounding the bore of the well.

In the above quotation, His Honor, Judge Morrow, has erroneously treated these *three separate and distinct casings* as one and the same thing. Therefore, in construing Claims 9, 13, and 20, he has treated these *three distinct elements* thereof as *being only one element*. This confusion of these various elements may have been the reason for much of the conflict between the Circuit Court of Appeals' decision herein and the various prior decisions of the Circuit Court of Appeals for the Fifth Circuit.

Unquestionably such confusion of the mechanics involved must have led to a confusion in Judge Morrow's conclusions and findings. It is to be noted that Judges Dietrich and Gilbert were not misled by any such errors as to the mechanical facts.

Whatever incomplete conception or idea Byron Jackson had on April 29, 1903, (*after Layne had filed his application for the patent in suit,*) it is clear that Byron Jackson had not at that time done anything with such idea,—whatever it was,—for he says in his letter of April 29, 1903, to his agent Mead:

"but at present no such pump has been developed."

Here is a direct acknowledgement by this manufacturer of pumps that he had not, at the time Layne filed his application for the patent in suit, developed even the pump that he was writing about. It is to be

born in mind that this letter does not describe Layne's shaft-enclosing casing construction, with its three functions of alinement, protection and lubrication.

Very significant, in this connection, is Byron Jackson's letter to Mead under date of April 29, 1903 (R. pp. 118 to 120). When referring to this same matter, Byron Jackson says:

"It is true that this design of a pump does not take very much material or work after it is once developed, but at present no such pump has been developed."

Here is a direct admission by Byron Jackson that he had not prosecuted the matter with diligence; he was a manufacturer of pumps, and had been for years. Yet, if he had any conception of Layne's invention, (of which there is in fact no evidence,) he laid such conception aside, and did not reduce it to practice either by making and testing out an actual pump, or by filing an allowable application for patent thereon.

Analyzed as a defense of *prior invention*, the defense utterly fails. This defense is predicated upon the theory that, before Layne conceived his invention, Byron Jackson had conceived *the same invention* here in issue. But mere conception of an invention does not make one the first "inventor" in law. To merely have a mental idea (although it may be a *complete* idea), as to all the mechanical parts or devices to be assembled together, is not to have completed the in-

vention. Necessarily, every invention must be first conceived or thought out before it is put into actual embodiment in a machine or device. However, mental conception alone is insufficient to form the foundation of any right. Furthermore, merely explaining such an idea to another or making drawings is insufficient. *Either an actual reduction to practice of the invention or a constructive reduction to practice is necessary to establish one's right to an invention.* This is fully discussed in *Automatic Weighing Machine Co. vs. Pneumatic Scale Corporation*, 168 Fed. 288, the leading case on the subject.

In order that an inventor, who has reduced an invention to practice (either actually or constructively), may reach back *for his date of priority* to his conception of the invention, two things are necessary. First, he may not carry the date of his invention back before he had a concrete idea of the completed invention. That is to say, he had no conception of the invention at the date on which his idea was intangible, inchoate or incomplete. He had no conception of a given invention unless his mental idea of that invention was so complete that, put in mechanical embodiment as he then had it in his mind, it would be a complete and operative machine or device embodying the inventive idea in question. Second, having had such a concrete and complete conception of the given invention, such inventor must, *with reasonable diligence*, (i. e. that diligence usually exercised by a prudent business man,

pursuing business matters of usual importance), *reduce the invention to practice*.

It, therefore, is necessary to consider the so-called Byron Jackson defense from this standpoint. It is conceded that the Pabst pump was not completed until December, 1903, or January, 1904. In this connection, it must be remembered that the pipe, for the shaft-enclosing conduit, was purchased in Milwaukee and not sent from San Francisco. Byron Jackson never filed an application for patent on this subject matter. Therefore, there was no *constructive* reduction to practice.

What then is to be made of defendants' assertion that Byron Jackson was diligent? We believe that, from the time in April, 1903, that he took up the question of working out and designing a pump for this Pabst well, to the date when the pump was installed in the well, Byron Jackson was diligent. But the difficulty is,—Where is the evidence that Byron Jackson had a conception of the complete invention, here in dispute, at any time prior to May, 1903, or at any given time? No drawing has been produced that clearly and unmistakably shows the Layne combination; no written description, made prior to May, 1903, is produced which shows such a conception. On the contrary, Byron Jackson's letters to his agent Mead show that he was groping in the dark during April, 1903; that he had no complete conception himself of what he was going to do or what he intended to do.

It is to be noted that defendants, or Judge Morrow, do not attempt to point out *when* Byron Jackson had a *complete conception* of this Layne invention. Defendants do not refer to any written description, to any letter or to any drawing completed prior to Layne's filing date or prior to the date upon which Layne's application was signed (April 3, 1903), from which the Court can find a completed idea or conception of the Layne invention. This is necessary in order to sustain the defense of "prior invention." The burden of proof is on the defendants. Any reasonable doubt must be resolved against defendants. The more carefully the court analyzes the Mead-Jackson correspondence and scans the various exhibits and drawings, the more clear it will become to the Court that there is no proof that Byron Jackson had a conception of the complete invention prior to May, 1903.

Judge Morrow, speaking for the majority of the Circuit Court of Appeals, refers to the agreement drawn up April 20, 1903, by the Pabst Company, and submitted to Byron Jackson for his approval. It is to be noted, in this connection, that Judge Morrow evidently draws an erroneous inference from this contract. *First*, the proposed contract was the draft of a contract *as proposed by Pabst*. This was not accepted by Jackson. *Second*, while it states the problem, it does not describe or state *how* the problem is to be solved. That there is nothing in this provision of Pabst's proposed contract which would teach an ordinary me-

chanic, skilled in the art, how to construct such a pump, is demonstrated by Byron Jackson's own letters of March 31, 1902 (Rec. p. 101) and of April 14, 1903 (Rec. 102), heretofore quoted herein.

Furthermore, this alleged description is too late. Layne's application for patent was executed seventeen (17) days before the date of this exhibit. See page 4 of Layne's patent, lines 88-90: "In testimony whereof I have hereunto set my hand, *this 3rd day of April, 1903*, at Chicago, Illinois."

Furthermore, plaintiff proved Layne's date of conception to have been as early as April, 1902, which antedates any alleged conception on the part of Byron Jackson (Rec., 860; 868).

Plaintiff submits, therefore, that this defense of prior invention has not been established; that it was error for the majority of the Circuit Court of Appeals in this case to use it to whittle away the scope of the Layne invention. It was not a completed invention by Byron Jackson prior to Mr. Layne's filing date, and it had no effect upon Mr. Layne's rights to a patent. It is not a part of the art prior to Mr. Layne's invention and should and can not have any effect as subtracting therefrom any of Mr. Layne's fundamental, generic conception. Unquestionably Mr. Layne was first.

CONCLUSION

We submit that the decree of the District Court was correct and should be affirmed; that the decree of the Circuit Court of Appeals is in error and should be reversed. That the decree of the Circuit Court of Appeals is based upon a misconception of the mechanics and of the mechanical facts involved in the case; that it is based upon findings of fact by the majority of said Court, disavowed by the minority, which findings are contrary to the preponderance of evidence; that Judge Dietrich's findings of fact should have been accepted, as the same are unassailable, (*Adamson vs. Gilliland, supra*,); that said majority opinion is in error in its strict construction and interpretation and limitation of the scope of the claims of the patent in suit that liberality, rather than strictness, should prevail, where the court is dealing with an invention of the importance and standing in the art of that of the invention of Mr. Layne.

We submit that the findings of the Circuit Court of Appeals for the Fifth Circuit:

In the *Van Ness* case, that: "*Layne filled a long-felt need in the deep well irrigating business by his protective casing, and had invented a practicable and valuable improvement in the art and one entitled to protection for that reason, however theoretically its novelty and patentability may admit of doubt*";

In the *Getty* case, that: "The Layne patent . . . did accomplish a revolution in the well-drilling industry";

the findings of Judge Dietrich that: "Though not, strictly speaking, a pioneer, the patent is of a fundamental, generic character, and in expressing his conception in physical form the patentee is entitled to a reasonable range of mechanical equivalents." (R. p. 891);

and the findings and conclusion of Presiding Circuit Judge Gilbert in his dissenting opinion in the Court of Appeals, that: "There can be no doubt that the appellee's invention did, as was said in the case of *Getty vs. Layne* (C. C. A.), 262 Fed. 141, *accomplish a revolution in the well-drilling industry*. And while the invention may not be said to be of a pioneer character, it is, nevertheless, an invention of such merit as to be entitled to protection against a reasonable range of mechanical equivalents."

are correct, and that, as said by this Court in the *Paper Bag* case, 210 U. S., *supra*, *the mere substitution of mechanical equivalents cannot avoid infringement*.

This being true, the following remarks of Judge Coxe, in *Hallock vs. Davison*, 107 Fed. 482, 486, are most pertinent:

"If there be one central controlling purpose deducible from all these decisions, and many more that might be quoted, it is the steadfast determination of the Court to protect and reward the man who has done something which has actually advanced the condition of mankind, something by

which the work of the world is done better and more expeditiously than it was before."

Respectfully submitted.

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